



## **Alaska Responsible Fishery Management (RFM) Certification**

### **2<sup>nd</sup> Surveillance Report**

*For The*

### **U.S. Alaska Bering Sea and Aleutian Islands King, Tanner and Snow Crab Commercial Fisheries**

*Facilitated by*

**Alaska Seafood Marketing Institute (ASMI)**

*And*

**Bering Sea Crab Client Group LLC**

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**Report Code:** AK/AK/CRA/002.2/2018

**Published Date:** 18<sup>th</sup> April 2019

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## Foreword

The Alaska Responsible Fisheries Management (RFM) Standard Version 1.3 is composed of Conformance Criteria and is based on the 1995 FAO Code of Conduct for Responsible Fisheries and the FAO Guidelines for the Eco-labelling of Fish and Fishery Products from Marine Capture Fisheries adopted in 2005 and amended/extended in 2009. The Standard also includes full reference to the 2011 FAO Guidelines for the Eco-labelling of Fish and Fishery Products from Inland Fisheries which in turn are now supported by a suite of guidelines and support documents published by the UN FAO.

Further information on the Alaska RFM program may be found here:

<https://www.alaskaseafood.org/rfm-certification/certified-fisheries/>

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## Glossary

<b>ABC</b>	Allowable Biological Catch
<b>ADFG</b>	Alaska Department of Fish and Game
<b>AFA</b>	American Fisheries Act
<b>AFSC</b>	Alaska Fisheries Science Center
<b>AIGKC</b>	Aleutian Island Golden King Crab
<b>ASMI</b>	Alaska Seafood Marketing Institute
<b>BBRKC</b>	Bristol Bay Red King Crab
<b>BOF</b>	Board of Fisheries
<b>BSAI</b>	Bering Sea and Aleutian Islands
<b>CCRF</b>	Code of Conduct for Responsible Fisheries
<b>CDQ</b>	Community Development Quota
<b>CFEC</b>	Commercial Fisheries Entry Commission
<b>CPUE</b>	Catch per Unit Effort
<b>EBSSC</b>	Eastern Bering Sea Snow Crab
<b>EBSTC</b>	Eastern Bering Sea Tanner Crab
<b>EIS</b>	Environmental Impact Statement
<b>EEZ</b>	Exclusive Economic Zone
<b>EFH</b>	Essential Fish Habitat
<b>ESA</b>	Endangered Species Act
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FMP</b>	Fishery Management Plan
<b>GOA</b>	Gulf of Alaska
<b>GHL</b>	Guideline Harvest Level
<b>IFQ</b>	Individual Fishing Quota
<b>IRFA</b>	Initial Regulatory Flexibility Analysis
<b>IRIU</b>	Improved Retention/Improved Utilization
<b>LLP</b>	License Limitation Program
<b>MSA</b>	Magnuson-Stevens Fisheries Management and Conservation Act
<b>mt</b>	Metric tons
<b>MSY</b>	Maximum Sustainable Yield
<b>NEPA</b>	National Environmental Policy Act
<b>Nm</b>	Nautical miles
<b>NMFS</b>	National Marine Fisheries Service
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>NPFMC</b>	North Pacific Fishery Management Council
<b>OFL</b>	Overfishing Level
<b>OLE</b>	Office for Law Enforcement
<b>OY</b>	Optimum Yield
<b>PSC</b>	Prohibited Species Catch
<b>SMBKC</b>	St. Matthew Island Blue King Crab
<b>RACE</b>	Resource Assessment and Conservation Engineering
<b>REFM</b>	Resource Ecology and Fisheries Management
<b>RFM</b>	Responsible Fisheries Management
<b>SAFE</b>	Stock Assessment and Fishery Evaluation (Report)
<b>SSC</b>	Scientific and Statistical Committee
<b>SSL</b>	Steller Sea Lion
<b>TAC</b>	Total Allowable Catch
<b>USCG</b>	U.S. Coast Guard

## Summary and Recommendations

This report is the 2<sup>nd</sup> Surveillance Report (ref AK/CRA/002.2/2018) for the U.S. Alaska Bering Sea and Aleutian Islands King, Snow Crab and Tanner commercial fisheries produced on behalf of the Bering Sea Crab Client Group LLC according to the Alaska Based Responsible Fisheries Management (RFM) Certification Program. The Bristol Bay Red King Crab (*Paralithodes camtschaticus*), St. Matthew Island Blue King Crab (*Paralithodes platypus*) and Eastern Bering Sea Snow Crab (*Chionoecetes opilio*) commercial fisheries were originally certified on 16<sup>th</sup> of April 2012. More recently on December 7<sup>th</sup> 2017, the Eastern Bering Sea Tanner Crab (*Chionoecetes bairdi*), Aleutian Islands Golden King Crab (*Lithodes aequispinus*) fisheries were certified.

The objective of this Surveillance Report is to monitor for, and evaluate the impacts of, any changes to the management regime, regulations and their implementation since the previous assessment. Having assessed these changes to the fishery (if any) the Assessment Team determines if these changes materially affect the fisheries' conformance to the AKRFM Standard and whether current practices remain consistent with the overall confidence ratings assigned during either initial certification or subsequent surveillance audits where the original confidence rating(s) have been changed.

In addition to this, any areas reported as "items for surveillance" or corrective action plans in the previous assessment are reassessed and a new conclusion on consistency of these items with the Conformance Criteria is given accordingly. No non-conformances were identified since certification was granted.

The certification covers the U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow Crab commercial fisheries [Bristol Bay Red King Crab (*Paralithodes camtschaticus*), St. Matthew Island Blue King Crab (*Paralithodes platypus*), Eastern Bering Sea Tanner Crab (*Chionoecetes bairdi*), Aleutian Islands Golden King Crab (*Lithodes aequispinus*), and Eastern Bering Sea Snow Crab (*Chionoecetes opilio*)] legally employing pot gear within Alaska jurisdiction (200 nautical miles EEZ) and subject to a federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) & Board of Fisheries (BOF)] joint management regime.

The surveillance assessment was conducted according to the SAI Global Certification procedures for Alaska Responsible Fisheries Management Certification using the FAO – Based RFM Conformance Criteria (v1.3) fundamental clauses as the assessment framework.

The assessment was conducted by an Assessment Team comprised of two externally contracted fishery experts and SAI Global internal staff; details of the assessment team are provided in Appendix 1.

The main key outcomes have been summarized in Section 5 Assessment Outcome Summary

## Assessment Team Details

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## 1. Introduction

This Surveillance Report documents the 2<sup>nd</sup> Surveillance Assessment of the U.S. Alaska Bering Sea and Aleutian Islands King, Snow Crab commercial fisheries originally certified on April 16 2012 and the Eastern Bering Sea Tanner Crab, Aleutian Islands Golden King Crab fisheries that were recently certified on December 7<sup>th</sup> 2017, and presents the recommendation of the Assessment Team that the fisheries be awarded continuing Certification.

### Units of Certification

The U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow Crab commercial fisheries [Bristol Bay Red King Crab (*Paralithodes camtschaticus*), St. Matthew Island Blue King Crab (*Paralithodes platypus*), Eastern Bering Sea Tanner Crab (*Chionoecetes bairdi*), Aleutian Islands Golden King Crab (*Lithodes aequispinus*), and Eastern Bering Sea Snow Crab (*Chionoecetes opilio*)] legally employing pot gear within Alaska jurisdiction (200 nautical miles EEZ) and subject to a federal [National Marine Fisheries Service (NMFS)/North Pacific Fishery Management Council (NPFMC)] and state [Alaska Department of Fish and Game (ADFG) & Board of Fisheries (BOF)] joint management regime. The UoCs are as described in Table 2.

This Surveillance Report documents the assessment results for the continued certification of the above fisheries to the Alaska RFM Certification Program which is a voluntary program that has been supported by ASMI who wish to provide an independent, third-party certification that can be used to verify that these fisheries are responsibly managed.

The assessment was conducted according to the SAI Global procedures for Alaska RFM Certification using the fundamental clauses of the Alaska RFM Conformance Criteria Version (v1.3) in accordance with ISO 17065 accredited certification procedures.

The assessment is based on 6 major components of responsible management derived from the FAO Code of Conduct for Responsible Fisheries (1995) and Guidelines for the Eco-labelling of products from marine capture fisheries (2009); including:

- A. [The Fisheries Management System](#)
- B. [Science and Stock Assessment Activities](#)
- C. [The Precautionary Approach](#)
- D. [Management Measures](#)
- E. [Implementation, Monitoring and Control](#)
- F. [Serious Impacts of the Fishery on the Ecosystem](#)

These six major components are supported by 12 fundamental clauses (+ 1 in case of enhanced fisheries) that guide the FAO-Based RFM Certification Program surveillance assessment.

A summary of the site meetings is presented in Section 5. Assessors included both externally contracted fishery experts and Global Trust internal staff (Appendix 1).

### 1.1. Recommendation of the Assessment Team

Following this 2<sup>nd</sup> Surveillance Assessment, the assessment team recommends that continued Certification under the Alaska Responsible Fisheries Management Certification Program is maintained for the management system of the applicant fisheries, the U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow Crab commercial fisheries [Bristol Bay Red King Crab (*Paralithodes camtschaticus*), St. Matthew Island Blue King Crab (*Paralithodes platypus*), Eastern Bering Sea Tanner Crab (*Chionoecetes bairdi*), Aleutian Islands Golden King Crab (*Lithodes aequispinus*), and Eastern Bering Sea Snow Crab (*Chionoecetes opilio*)] legally employing pot gear within the U.S. EEZ off Alaska.



## 2. Fishery Applicant Details

**Table 1.** Fishery applicant details.

<b>Organization/Company Name:</b>	Bering Sea Crab Client Group LLC
<b>Date:</b>	01/14/2019
<b>Correspondence Address:</b>	
<b>Street:</b>	23929 22ND Drive, SE, Bothell
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### 3. Proposed Unit(s) of Assessment and Certification

The applicant Units of Assessment (UoA) (i.e., what is to be assessed) are described by the following Table 2.

**Table 2. Unit of Assessment (UoA).**

Unit of Assessment (UoA)					
Species:	Common name:	1	Red King Crab	Stock:	Bristol Bay
	Latin name:		<i>Paralithodes camtschaticus</i>		
	Common name:	2	Blue King Crab		St. Matthew Island
	Latin name:		<i>Paralithodes platypus</i>		
	Common name:	3	Golden King Crab		Aleutian Islands
	Latin name:		<i>Lithodes aequispinus</i>		
	Common name:	4	Snow crab		Eastern Bering Sea
	Latin name:		<i>Chionoecetes opilio</i>		
Common name:	5	Tanner Crab	Eastern Bering Sea		
Latin name:		<i>Chionoecetes bairdi</i>			
Geographical Area(s)		All	U.S. Federal and State fisheries within the Gulf of Alaska and the Bering Sea & Aleutian Islands.		
Management System		All	U.S. Federal and State fisheries within the Gulf of Alaska and the Bering Sea & Aleutian Islands managed by: <ul style="list-style-type: none"> <li>• NOAA Alaska Regional Office or National Marine Fisheries Service (NMFS)</li> <li>• North Pacific Fishery Management Council (NPFMC)</li> <li>• Alaska Department of Fish and Game (ADFG) and Board of Fisheries (BOF)</li> </ul>		
Fishing gear(s)		All	Trap Gear (Baited pots)		

## 4. Fishery Observations

### 4.1. Stock status, landings and TAC update<sup>1</sup>

#### 4.1.1. Eastern Bering Sea Snow Crab

##### Stock Status

- 2017/2018 total catch = 10.5 thousand t
- 2017/2018 OFL = 28.4 thousand t
- **Overfishing did not occur**
  
- 2017/2018 MSST = 71.4 thousand t
- 2017/2018 MMB = 99.60 thousand t
- **Stock is not overfished (70%)**
  
- 2018/2019 MMB = 123.10 thousand t
- **Stock is not approaching overfished**

Total catch mortality in 2016/17 was 11,000 t (with discard mortality rates applied), while the retained catch in the directed fishery was 9,700 t (Table 3). This was below the 2016/17 OFL of 23,700 t. Snow Crab bycatch occurs in the directed fishery and to a lesser extent in the groundfish trawl fisheries. Estimates of trawl bycatch in recent years are less than 1% of the total Snow Crab catch. Estimates of stock status were above the BMSY proxy for this stock (B35%) in 2010/11-2012/13, but below the BMSY proxy more recently. For 2017/18, the ratio of projected MMB (99.6 t) fishing at the FOFL to BMSY (139,400 t) remains less than 1 but above 0.5.

**Table 3.** Historical status and catch specifications for Snow Crab (thousand t). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2014/15	78.9	168.0	30.8	30.8	34.3	69.0	62.1
2015/16	75.8	91.6	18.4	18.4	21.4	83.1	62.3
2016/17	75.8	96.1	9.7	9.7	11.0	23.7	21.3
2017/18	71.4	99.6	8.6	8.6	10.5	28.4	22.7
2018/19		123.1				29.7	23.8

<sup>1</sup> <https://www.npfmc.org/fishery-management-plan-team/bsai-crab-plan-team/#currentcrab>

#### 4.1.2. Bristol Bay Red King Crab

##### Stock Status

- 2017/2018 total catch = 3.48 thousand t
- 2017/2018 OFL = 5.60 thousand t
- **Overfishing did not occur**
  
- 2017/2018 MSST=12.74 thousand t
- 2017/2018 MMB = 24.86 thousand t
- **Stock is not overfished (97%)**
  
- 2018/2019 MMB = 20.80 thousand t
- **Stock is not approaching overfished**

The commercial harvest of Bristol Bay Red King Crab (BBRKC) dates to the 1930s. The fishery was initially prosecuted mostly by foreign fleets but shifted to a largely domestic fishery in the early 1970s. Retained catch peaked in 1980 58,900 t, but harvests dropped sharply in the early 1980s, and population abundance has remained at relatively low levels over the last two decades compared to those seen in the 1970s. The fishery is managed for a total allowable catch (TAC) coupled with restrictions for sex (males only), a minimum size for legal retention (16.5 cm carapace width; 13.5 cm carapace length is used a proxy for 16.5 cm carapace width in the assessment), and season (no fishing during mating/molting periods). In addition to the retained catch that occurs during the commercial fishery, which is limited by the TAC, there is also retained catch that occurs in the ADFG cost-recovery fishery.

The current SOA harvest strategy allows a maximum harvest rate of 15% of mature-sized ( $\geq 120$  mm CL) males, but also incorporates a maximum harvest rate of 50% of legal males and a threshold of 8.4 million mature-sized ( $\geq 90$  mm CL) females and 6,600 t of effective spawning biomass (ESB), to prosecute a fishery (Table 4). Annual non-retained catch of female and sublegal male RKC averaged less than 8,600 t since data collection began in 1990. Total catch (retained and bycatch mortality) increased from 7,600 t in 2004/05 to 10,600 t in 2007/08 but has decreased since then; retained catch in 2017/18 was 3,090 t and total catch mortality was 3,480 t.

**Table 4.** Historical status and catch specifications for Bristol Bay Red King Crab (thousand t). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2014/15	13.03	27.25	4.49	4.54	5.44	6.82	6.14
2015/16	12.89	27.68	4.52	4.61	5.34	6.73	6.06
2016/17	12.53	25.81	3.84	3.92	4.28	6.64	5.97
2017/18	12.74	24.86	2.99	3.09	3.48	5.60	5.04
2018/19		20.80				5.34	4.27

### 4.1.3. Eastern Bering Sea Tanner Crab

#### Stock Status

- 2017/2018 total catch = 2.37 thousand t
- 2017/2018 OFL = 25.42 thousand t
- **Overfishing did not occur**
  
- 2017/2018 MSST = 15.15 thousand t
- 2017/2018 MMB = 64.09 thousand t
- **Stock is not overfished**
  
- 2018/2019 MMB = 35.95 thousand t
- **Stock is not approaching overfished**

Eastern Bering Sea (EBS) Tanner Crab are caught in directed Tanner Crab fisheries, as bycatch in the groundfish fisheries, scallop fisheries, as bycatch in the directed Tanner Crab fishery (mainly as non-retained females and sublegal males), and other crab fisheries (notably, eastern Bering Sea Snow Crab and, to a lesser extent, Bristol Bay Red King Crab). A single OFL is set for Tanner Crab in the EBS. Under the Crab Rationalization Program, ADFG sets separate TACs for directed fisheries east and west of 166° W longitude. The mature male biomass was estimated to be below the Minimum Stock Size Threshold (0.5BMSY) in February 2010 (the assumed time of mating) based on trends in mature male biomass from the survey, and NMFS declared the stock overfished in September 2010. The directed fishery was closed from 2010/11 through 2012/13 crab fishery years.

NMFS determined the stock was not overfished in 2012 based on a new assessment model with a revised estimate of BMSY. The directed fishery was open for the 2013/14 to 2015/16 seasons with a total allowable catch (TAC) of 1,410 t in 2013/14, 6,850 t in 2014/15, and 8,920 t in 2015/16 (Table 5). The total retained catch in 2015/16 (8,910 t) was the largest taken in the fishery since 1992/93. In 2016/17, ADFG determined that mature female biomass did not meet the criteria for opening a fishery according to the regulatory harvest strategy, and the TAC was set at zero. Consequently, there was no directed harvest in 2016/17. In 2017/18, ADFG determined that a directed fishery could occur in the area west of 166°W longitude. The TAC was set at 1,130 t, of which 100% was taken.

**Table 5.** Historical status and catch specifications for Eastern Bering Sea Tanner Crab (thousand t). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2014/15	13.40	71.57	6.85	6.16	9.16	31.48	25.18
2015/16	12.82	73.93	8.92	8.91	11.38	27.19	21.75
2016/17	14.58	77.96	0.00	0.00	1.14	25.61	20.49
2017/18	15.15	64.09	1.13	1.13	2.37	25.42	20.33
2018/19		35.95				20.87	16.70

#### 4.1.4. St. Matthew Island Blue King Crab

##### Stock Status

- 2017/2018 total catch = 0.010 thousand t
- 2017/2018 OFL = 0.120 thousand t
- **Overfishing did not occur**
  
- 2017/2018 MSST= 1.85 thousand t
- 2017/2018 MMB = 1.29 thousand t
- **Stock biomass (35% BMSY) indicates overfished**
  
- 2018/2019 MMB = 1.31 thousand t
- **Stock biomass estimate below MSST**

The fishery was prosecuted as a directed fishery from 1977 to 1998. Harvests peaked in 1983/84 when 4,288 t were landed by 164 vessels. Harvest was fairly stable from 1986/87 to 1990/91, averaging 568 t annually. Harvest increased to a mean catch of 1,496 t during the 1991/92 to 1998/99 seasons until the fishery was declared overfished and closed in 1999 when the stock size estimate was below the MSST. In November 2000, Amendment 15 to the FMP was approved to implement a rebuilding plan for the St. Matthew Island Blue King Crab stock. The rebuilding plan included a harvest strategy identified in regulation by the Alaska Board of Fisheries, an area closure to control bycatch, and gear modifications. In 2008/09 and 2009/10, the MMB was estimated to be above *BMSY* for two years and the stock declared rebuilt in 2009.

The fishery re-opened in 2009/10 with a TAC of 529 t and 209 t of retained catch were harvested (Table 6). The 2010/11 TAC was 726 t and the fishery reported a retained catch of 573 t. The 2011/12 harvest of 853 t represented 80% of the 1,152 t TAC. In 2012/13, by contrast, harvesters landed 99% (733 t) of a reduced TAC of 740 t, though fishery efficiency, at about 10 crab per pot, was little changed from what it had been in each of the previous three years. The directed fishery was closed in 2013/14 due to declining trawl survey estimates of abundance and concerns about the health of the stock. The directed fishery resumed again in 2014/15 with a TAC of 300 t, but the fishery performance was relatively poor with the retained catch of 140 t. The TAC in 2015/16 was 190 t with a retained catch of 47 t. The fishery has been closed since 2016/17. Bycatch of non-retained Blue King Crab has occurred in the St. Matthew Blue King Crab fishery, the eastern Bering Sea Snow Crab fishery, and trawl and fixed-gear groundfish fisheries. Based on limited observer data, bycatch of sublegal male and female crabs in the directed Blue King Crab fishery off St. Matthew Island was relatively high when the fishery was prosecuted in the 1990s, and total bycatch (in terms of number of crabs captured) was often twice as high or higher than total catch of legal crabs.

**Table 6.** Historical status and catch specifications for St. Mathew Blue King Crab (thousand t). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2014/15	1.84	2.48	0.30	0.14	0.15	0.43	0.34
2015/16	1.84	2.11	0.19	0.05	0.05	0.28	0.22
2016/17	1.97	2.23	0.00	0.00	0.05	0.14	0.11
2017/18	1.85	1.29	0.00	0.00	0.01	0.12	0.10
2018/19		1.31				0.04	0.03

#### 4.1.5. Aleutian Islands Golden King Crab

##### Stock Status

The MMB is above MSST in 2017/18 therefore the stock is not overfished. Catch was below the OFL in 2017/18 therefore overfishing did not occur

The directed fishery has been prosecuted annually since the 1981/82 season. Retained catch peaked in 1986/87 at 6,667 t. and averaged 5,397 t. over the 1985/86-1989/90 seasons. Average harvests dropped sharply from 1989/90 to 1990/91 to a level of 3,129 t. for the period 1990/91–1995/96. Management based on a formally established GHl began with the 1996/97 season. The 2,676 t GHl established for the 1996/97 season, which was based on the previous five-year average catch, was subsequently reduced to 2,585 t beginning in 1998/99. The GHl (or TAC, since 2005/06) remained at 2,585 t for 2007/08 but was increased to 2,714 t for the 2008/09-2011/12 seasons, and to 2,853 t starting with the 2012/13 season. The TAC was reduced to 2,515 t for the 2016/17 season. This fishery is rationalized under the Crab Rationalization Program.

Total mortality of AI Golden King Crab includes retained catch in the directed fishery, mortality of discarded catch, and bycatch in fixed-gear and trawl groundfish fisheries, though bycatch in other fisheries is low compared to mortality in the directed fishery. Retained catch in the post-rationalized fishery (2005/06-2016/17) has ranged from 2,379 t in 2006/07 to 2,893 in 2013/14 (Table 7). Total mortality ranged from 2,461 t to 3,085 t for the same period.

**Table 7.** Historical status and catch specifications for Aleutian Islands Golden King Crab (thousand t). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch <sup>a</sup>	Total Catch <sup>a</sup>	OFL	ABC
2014/15	NA	NA	2.853	2.771	2.967	5.69	4.26
2015/16	NA	NA	2.853	2.729	2.964	5.69	4.26
2016/17	NA	NA	2.515	2.593	2.829	5.69	4.26
2017/18	6.044	14.205	2.515	2.585	2.942	6.048	4.536
2018/19		17.952				5.514	4.136

<sup>a</sup> Total retained catch plus estimated bycatch mortality of discarded bycatch during crab fisheries and groundfish fisheries.

#### **4.2. Enforcement update**

There were no significant changes to enforcement impacts of the Alaska BSAI king and Tanner Crab fisheries in the last year. In 2018, there were a total of 38 federal fisheries & safety boardings documented by the US Coast Guard: 9 boardings for vessels fishing BBRKC, 26 boardings for vessels fishing Tanner Crab and 3 boardings for vessels fishing AIGKC. A total of 3 notices of violation (NOVs) were issued, all to vessels fishing Tanner Crab and all in relation to expired visual distress signals.

#### **4.3. Ecosystem Update**

There were no significant changes to the ecosystem impacts of the Alaska BSAI king and Tanner Crab fisheries in the last year.

#### **4.4. Relevant changes to Legislation and Regulations**

There were no significant changes to the legislation and/or regulations that govern the Alaska BSAI king and Tanner Crab fisheries in the last year.

#### **4.5. Relevant changes to the Management Regime**

There were no significant changes to the management regime that governs the Alaska BSAI king and Tanner Crab fishery in the last year.



## 5. Surveillance Meetings

**Table 8.** Summary of meetings.

Date	Organization and Location	Representative	Main Topics of Discussion
12/17/2018	NOAA NMFS Alaska Fisheries Science Center Seattle, WA	Buck Stockhausen, Cody Szuwalski, Jim Ianelli	<b>Eastern Bering Sea Snow Crab, Eastern Bering Sea Tanner Crab St Matthew Island Blue King Crab</b> <ul style="list-style-type: none"> <li>• Developments in the scientific assessment methodology of the stock; changes to the harvest strategy and control rules for the fishery, fishery data and information.</li> <li>• Ongoing research activities to elucidate life history parameters or fisheries fleet dynamics.</li> </ul>
12/17/2018	Bering Sea Crab Client Group Seattle, WA	Scott Goodman, Jamie Goen, Gary Stauffer	<b>All Target Species</b> <ul style="list-style-type: none"> <li>• Developments in the scientific assessment methodology of the stock; changes to the harvest strategy and control rules for the fishery, fishery data and information.</li> <li>• Ongoing research activities to elucidate life history parameters or fisheries fleet dynamics Progress with Non-Conformances set at re- certification for the client fishery. Non-Conformance #2 (MINOR non-conformance: Clause 12.13) on AIGKC.</li> </ul>
12/18/2018	NPFMC (North Pacific Fisheries Management Council) Anchorage, AK	Diana Stram, Jim Armstrong	<b>All Target Species</b> <ul style="list-style-type: none"> <li>• Significant changes to the overarching management framework for BSAI crab.</li> <li>• Significant changes to the planning or permitting process for the coastal zone.</li> <li>• Significant user conflicts arise that would or could affect BSAI crab fisheries (e.g. concerns with impacts of oil or mining activities, coastal developments, etc.).</li> <li>• Amendments to the Crab FMP.</li> <li>• Notable changes in participation in BSAI crab fisheries (e.g. harvesters, processors).</li> <li>• Technological developments (gear improvements, processing techniques) of relevance to BSAI crab fisheries.</li> <li>• Notable changes to the legal and administrative framework at the state/federal level that are relevant to management of BSAI crab fisheries.</li> </ul>
12/19/18	ADFG Kodiak, AK	Mark Stichert, Ben Daly, Bo Whiteside, Ethan Nichols (tel.)	<b>St. Matthew Island Blue King Crab</b> <ul style="list-style-type: none"> <li>• Developments in the scientific assessment methodology of the stock.</li> <li>• Changes to the harvest strategy and control rules for the fishery.</li> <li>• Fishery data and information.</li> <li>• Ongoing research activities to elucidate life history parameters or fisheries fleet dynamics.</li> </ul>
12/19/18	NOAA AKFSC Kodiak, AK	Bob Foy	<b>All Target Species</b> <ul style="list-style-type: none"> <li>• Developments in the scientific assessment methodology of the stock.</li> </ul>

Date	Organization and Location	Representative	Main Topics of Discussion
			<ul style="list-style-type: none"> <li>• Changes to the harvest strategy and control rules for the fishery.</li> <li>• Fishery data and information.</li> <li>• Ongoing research activities to elucidate life history parameters or fisheries fleet dynamics.</li> </ul>
12/19/2018	Alaska Trooper Kodiak, AK	Lt Jon Streifel	<p><b>All Target Species</b></p> <ul style="list-style-type: none"> <li>• Enforcement legislation, rules or proposals. Significant changes and updates over calendar year 2018.</li> <li>• Enforcement of management measures that support reduction of bycatch and discards, reduction of impacts on habitat, 2018 updates.</li> <li>• Number of boardings, number of violations detected, types of violations for the species in question. General level of compliance overall. Updates for 2018.</li> <li>• Gear loss concerns? Updates for 2017 mostly related to longline gear and pots.</li> <li>• Relationships and interaction with USCG, updates for 2018.</li> </ul>
12/20/2018	NOAA Alaska NMFS Regional Office Juneau, AK	Mary Furuness, Jodi Pirtle, Stephanie Rapinski, Doug Duncan, Anne Marie Eich, Krista Milani	<p><b>All Target Species</b></p> <ul style="list-style-type: none"> <li>• Significant changes to the overarching management framework for BSAI crab</li> <li>• Significant changes to the planning or permitting process for the coastal zone.</li> <li>• Significant user conflicts arise that would or could affect BSAI crab fisheries (e.g. concerns with impacts of oil or mining activities, coastal developments, etc.).</li> <li>• Amendments to the Crab FMP.</li> <li>• Notable changes in participation in BSAI crab fisheries (e.g. harvesters, processors).</li> <li>• Technological developments (gear improvements, processing techniques) of relevance to BSAI crab fisheries.</li> <li>• Notable changes to the legal and administrative framework at the state/federal level that are relevant to management of BSAI crab fisheries.</li> </ul>
12/20/2018	USGS Coast Guard Juneau, AK	Lt Ivonne Yang, Drew Stafford	<p><b>All Target Species</b></p> <ul style="list-style-type: none"> <li>• Enforcement legislation, rules or proposals. Changes and updates over 2018.</li> <li>• Enforcement of management measures that support selectivity, reduction of discards, reduction of bycatch, 2018 updates.</li> <li>• Number of boardings, number of violations detected, types of violations for the species in question. BSAI Crab (BBKC, EBSSC, SMTBKC, Tanner Crab, AIGKC) for 2018.</li> <li>• Gear marking regulations, checking and concern relating the loss of gear.</li> </ul>

Date	Organization and Location	Representative	Main Topics of Discussion
			<ul style="list-style-type: none"> <li>• General level of compliance overall. Updates for 2013-2016.</li> </ul>
12/21/18	ADFG Juneau, AK	Jie Zheng, Shareef Sideek, Forrest Bowers	<p><b>Bristol Bay Red King Crab, St Matthew Blue King Crab, Aleutian Island Golden King Crab</b></p> <ul style="list-style-type: none"> <li>• Developments in the scientific assessment methodology of the stock; changes to the harvest strategy and control rules for the fishery, fishery data and information, ongoing research activities to elucidate life history parameters or fisheries fleet dynamics.</li> </ul>

## 6. Assessment Outcome Summary

### 6.1. Fundamental Clauses Summaries

#### **Fundamental Clause 1: Structured and legally mandated management system**

##### **Evidence adequacy rating: High**

There is a structured and legally mandated management system in place for the BSAI king and Tanner Crab fisheries. Alaska's BSAI crab stocks are managed under the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs (FMP). The crab FMP was developed under a negotiated agreement between the State of Alaska and the federal government. The result was a state/federal fishery management plan (FMP) which incorporated concerns of the NPFMC, NMFS and MSA requirements on the federal side and ADFG, the BOF and Alaska statutes on the state side. This balance resulted in true Joint Management where the needs of both Alaska residents and those from other states were met. The crab FMP has three categories of regulations which reflect the state and federal emphasis. Once the state and federal agencies and the BOF and NPFMC arrived at consensus and put the Joint management document to public review, it was submitted to the Secretary of Commerce who accepted joint management for the BSAI crab fisheries.

#### **Fundamental Clause 2: Coastal area management frameworks**

##### **Evidence adequacy rating: High**

The NMFS and the NPFMC participate in coastal area management-related institutional frameworks through the federal National Environmental Policy Act (NEPA) processes. This occurs whenever resources under their management may be affected by other developments and each time they create, renew or amend regulations. The fishery management agencies have processes, committees and groups that allow potential coastal zone developments and issues to be brought to formal review and engagement such as the NPFMC meetings or the BOF meetings. From witnessing the processes, interviews with representatives of these organizations, The Council and the BOF actively encourage stakeholder participation, and all their deliberations are conducted in open, public sessions. Decisions are transparently documented on the various websites of these organizations in a timely manner.

#### **Fundamental Clause 3: Management objectives and plan**

##### **Evidence adequacy rating: High**

Long-term objectives for the fishery are outlined in the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs (NPFMC 2011). FMP objectives are dictated by, and consistent with, the Magnuson-Stevens Act (MSA). The decision-making processes of responsible agencies are extremely transparent and inclusive of all stakeholders, thereby ensuring that the plan is subscribed to by all interested parties. Conservation and management measures ensure that excess fishing capacity is avoided and exploitation of the stocks remains economically viable

#### **Fundamental Clause 4: Fishery data**

##### **Evidence adequacy rating: High**

The collection, aggregation and use of data in stock assessments for the BSAI crab fisheries are undertaken through collaboration between the NPFMC, the NMFS and ADFG. Data collection, analysis and stock assessment of the BSAI crab fisheries respect the NPFMC's BSAI crab FMP requirements. NMFS and ADFG collect fishery dependent data and undertake fishery-independent surveys for all BSAI crab fisheries providing the basis for the assessment of the crab stocks and their impact on the ecosystem. The NMFS annual trawl surveys of the eastern Bering Sea provide indices of relative abundance and biomass for four of the five fisheries under consideration. Full details of the datasets for the five fisheries and their time series can be found in the annual Stock Assessment and Fishery Evaluation (SAFE) reports.

### **Fundamental Clause 5: Stock assessment**

#### **Evidence adequacy rating: High**

The NMFS undertakes shellfish stock assessments through the annual Eastern Bering Sea trawl survey which provides the primary input to the shellfish assessments. Information derived from both regular surveys and associated research are analyzed by AFSC stock assessment scientists and supplied to fishery management agencies and to the commercial fishing industry. In addition, economic and ecosystem assessments are provided to the Council on an annual basis.

For the BBRKC fishery, a length-based analysis (LBA) model combines multiple sources of survey, catch and bycatch data using a maximum likelihood approach to estimate abundance, recruitment and catchabilities, catches and bycatch of the commercial pot fisheries and groundfish trawl fisheries. For the SMBKC fishery a three-stage catch-survey analysis (CSA) assesses the male component of the stock incorporating data from commercial catches from the directed fishery and its observer program, the annual EBS trawl survey, triennial pot surveys and bycatch data from the groundfish trawl fishery. For the EBSSC fishery the stock assessment uses a size and sex-structured model which is fitted to time series of total catch data from the directed fishery and bycatch data from the trawl fishery, size frequency data from the catch in the pot fishery and the bycatch in both the pot and trawl fisheries, and abundance data from the NMFS trawl survey and two recent BSFRF surveys. For the AIGKC fishery, the stock assessment uses a length-based model that combines a variety of catch, catch composition and catch discard data from commercial crab and groundfish (trawl and pot) fisheries and standardized observer legal size catch-per-unit-effort (CPUE) as indices of abundance. For the EBSTC fishery, the stock assessment model is a stage/size-based population dynamics model that incorporates sex (male, female), shell condition (new shell, old shell), and maturity (immature, mature) as different categories into which the overall stock is divided on a size-specific basis.

An ongoing goal is to produce an ecosystem assessment utilizing a blend of data analysis and modelling to clearly communicate the current status and possible future directions of ecosystems.

### **Fundamental Clause 6: Biological reference points and harvest control rule**

#### **Evidence adequacy rating: Medium**

The status determination criteria for crab stocks are calculated on an annual basis using a five-tier system that accommodates varying levels of uncertainty of information, and incorporates new scientific information providing a mechanism for continually improving the status determination criteria as more information becomes available. For example, for tier 3 stocks, the target reference point is B35% (when spawning biomass is reduced to 35% of the unfished condition), a proxy for BMSY, or biomass at Maximum Sustainable Yield (MSY). Stock status of BSAI crabs are determined by two metrics. Firstly, the stock is considered to be overfished if the stock size is estimated to be below the minimum stock size threshold (MSST) or limit reference point (1/2 MSY). Secondly, overfishing is considered to have occurred if the exploitation level, or fishing mortality, exceeds the fishing mortality at the overfishing level (FOFL), or more intuitively if the total catch exceeds the OFL level (equivalent to MSY).

As reported in the 2018 assessment (Zheng and Ianelli 2018), estimated total male catch is the sum of fishery reported retained catch, estimated male discard mortality in the directed fishery, and estimated male bycatch mortality in the groundfish fisheries. Based on the reference model for SMBKC, the estimate for mature male biomass is below the minimum stock-size threshold (MSST) in 2017/18 and is hence in an “overfished” condition, despite fishery closures in the last two years (and hence overfishing has not occurred) (Tables 1 and 2). Computations which indicate the relative impact of fishing (i.e. “dynamic B0”) suggests that the current spawning stock biomass has been reduced to 60% of what it would have been in the absence of fishing.

This new information about SMBKC stock status prompted the assessment team to re-score supporting clause 6.3: *Data and assessment procedures shall be installed measuring the position of the fishery in relation to the reference points. Accordingly, the stock under consideration shall not be overfished (i.e. above limit reference point or proxy) and the level of fishing permitted shall be commensurate with the current state of the fishery resources, maintaining its future availability, taking into account that long term changes in productivity can occur due to natural variability and/or impacts other than fishing.*

The RFM Program provides assessment teams with guidance for scoring clause 6.3 which consists of three evaluation parameters: process; current status/appropriateness/effectiveness; and evidence basis. With respect to the first evaluation parameter, we find strong evidence of conformity because the Council process has been followed and the stock assessment was conducted according to procedure using the appropriate datasets to measure the position of the fishery in relation to its limit reference point (MSST). With respect to the third evaluation parameter, we find strong evidence of conformity because the stock assessment of SMBKC, as documented in the SAFE report, was based on high-quality information. With respect to the second evaluation parameter, however, we find that the stock under consideration (SMBKC) does not meet the RFM criterion for current status/appropriateness/effectiveness because the stock is below its limit reference point and therefore designated as ‘overfished’ (NMFS Letter to NPFMC, Oct 2018). Consequently, clause 6.3 is lacking in one evaluation parameter and must therefore be assigned a medium confidence rating. A minor non-conformity is raised.

#### **Fundamental Clause 7: Precautionary approach**

##### **Evidence adequacy rating: High**

The overall management for the BBRKC, EBSSC, SMBKC, AIGKC and EBSTC comprises all the elements as specified in the FAO guidelines for the precautionary approach. FAO Guidelines for the Precautionary Approach (PA) (FAO 1995) advocate a comprehensive management process that includes data collection, monitoring, research, enforcement, and review. Absence of adequate scientific information is not used as a reason for postponing or failing to take conservation and management measures. The five crab stocks under consideration are managed under a tier system rule based on stock knowledge.

Status determination criteria for crab stocks are annually calculated using a five-tier system that accommodates varying levels of uncertainty of information. The five-tier system incorporates new scientific information and provides a mechanism to continually improve the status determination criteria as new information becomes available. The lower the tier, the less conservative the determination of OFL/ABC and ACL are, due to a greater level of information being known about the stock. Higher tier stocks are managed more conservatively due to gaps in the information about the stock. This system is intrinsically precautionary in nature and the results involve catches always lower than the overfishing level. The annual assessments and subsequent SAFE reports for the BSAI crab fisheries allow for the identification of areas where there are gaps in the knowledge of the stock which require further research and/or improvements.

#### **Fundamental Clause 8: Management measures**

##### **Evidence adequacy rating: High**

Conservation and management measures are in place to ensure the long-term sustainability of BSAI crab resources at levels which promote optimum utilization that are based on verifiable and objective scientific and traditional, fisher and community sources. Long-term fisheries management objectives are outlined in the BSAI Crab FMP. State regulations for the king and snow (& Tanner crab) fisheries are listed under the Alaska Administrative Code, Title 5, Chapter 34 and 35. The MSA, as amended, sets out ten national standards for fishery conservation and management (16 U.S.C. § 1851) to which all fishery management plans must be consistent. Conservation of aquatic habitats and biodiversity are integral parts of the NPFMC’s management process. These concerns and

decisions are summarized annually in the AFSC Alaska Marine Ecosystem Status Reports (formerly known as “Ecosystems Considerations reports”) and the ecosystem sections of each annual Stock Assessment and Fishery Evaluation (SAFE) report. Furthermore, Essential Fish Habitat (EFH) identification and protection constitute a key objective for the management system as outlined in the BSAI crab FMP.

#### **Fundamental Clause 9: Appropriate standards of fisher’s competence**

##### **Evidence adequacy rating: High**

Advanced education and training programs are readily available and required by fishers to enhance their skills and professional qualifications. All those engaged in BSAI crab fishing operations are provided information on the most important provisions of the FAO CCRF (1995), as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations, as part of required education and training. Records of all BSAI crab fishers are maintained as part of license and permit programs which contain information on their service and qualifications, including certificates of competency.

#### **Fundamental Clause 10: Effective legal and administrative framework**

##### **Evidence adequacy rating: High**

There is a division of effort and emphasis in the at-sea enforcement between the USCG and the AWT. Under joint management there are both state and federal laws to enforce, and both state and federal agents actively conduct at-sea enforcement. The USCG is responsible for enforcing the main federal vessel regulations: this includes safety at sea, drug enforcement, vessel compliance with ESA and EFH requirements and assuring compliance of federal permits, observer coverage, licenses and VMS in the crab fisheries. AWT have vessels that conduct at-sea compliance with gear regulations, capable of hauling and confiscating crab pots, sample crab harvests at sea, assure sex and size requirements are met and assure that the vessels have all required state and federal licenses. Additionally AWT, along with ADFG area biologists and technicians, conduct vessel inspections dockside, conducting hold inspections and observing offloads of harvested crab for compliance. The entire crab harvests are conducted in Alaskan waters by American vessels. No foreign fleet is allowed to fish in the Alaska’s EEZ. Because the fishery was rationalized in 2005, most enforcement of IFQ/IPQ violations, as well as size, sex and season violations occur at offloading. In 2018, there were a total of 38 federal fisheries & safety boardings documented by the US Coast Guard: 9 boardings for vessels fishing BBRKC, 26 boardings for vessels fishing Tanner Crab and 3 boardings for vessels fishing AIGKC. A total of 3 notices of violation (NOVs) were issued, all to vessels fishing Tanner Crab and all in relation to expired visual distress signals.

#### **Fundamental Clause 11: Framework for sanctions**

##### **Evidence adequacy rating: High**

In Alaska waters, enforcement policy section 50CFR600.740 states: (a) The MSA provides four basic enforcement remedies for violations, in ascending order of severity, as follows: (1) Issuance of a citation (a type of warning), usually at the scene of the offense (see 15 CFR part 904, subpart E). (2) Assessment by the Administrator of a civil money penalty. (3) For certain violations, judicial forfeiture action against the vessel and its catch. (4) Criminal prosecution of the owner or operator for some offenses. The MSA treats sanctions against the fishing vessel permit to be the carried out of a purpose separate from that accomplished by civil and criminal penalties against the vessel or its owner or operator. The 2011 Policy for the Assessment of Civil Administrative Penalties and Permit Sanctions issued by NOAA Office of the General Counsel – Enforcement and Litigation, provides guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA. The Marine Division of AWT and the State of Alaska Department of Law pursue a very aggressive enforcement policy. They attend the BOF and are integral into the process for regulation formulation and legislation, analogous to the USCG attendance and input in the Council process. AWT has Statutory / Regulatory legislation pertaining to their Authority.

**Fundamental Clause 12: Impacts of the fishery on the ecosystem****Evidence adequacy rating: Medium**

There is in place a robust fisheries management system that appropriately and adequately considers fishery interactions and effects on the ecosystem. The BSAI crab fishery management system is based on the best available science while allowing for inputs from fishery participants and other stakeholders. The management system also incorporates risk-based approaches for determining most probable adverse impacts of the fishery so that potentially adverse impacts of the fishery on the ecosystem are appropriately assessed and effectively addressed. Habitat protection areas, prohibited species catch (PSC) limits and crab bycatch limits are in place to protect important benthic habitat for crab and other resources and to reduce crab bycatch in the trawl and fixed gear groundfish fisheries. If PSC limits are reached in bottom trawl fisheries executed in specific areas, those fisheries are closed. The crab fisheries catch a small amount of other species as bycatch. A limited number of groundfish, such as Pacific cod, Pacific halibut, yellowfin sole, and sculpin are caught in the directed pot fishery. The invertebrate component of bycatch includes echinoderms, snails, non-FMP crab, and other invertebrates. As noted in the Endangered Species Act EIS report, crab fisheries do not adversely affect ESA listed species, destroy or modify their habitat, or comprise a measurable portion of their diet. Based on food habits data collected in the summer months during the annual EBS bottom trawl survey, Pacific cod, Pacific halibut and skates are the primary predators of large or legal size crab although legal-sized crab are a minimal component of these predators diets. The short and long term effects of removing large male crab from a population are not well understood and may vary by species and population as outlined in various scientific studies.

The Aleutian Islands Golden King Crab fishery takes place in deep water areas where coral and sponge habitats may be adversely impacted by bottom contact gear such as pots. For the AI GKC unit of certification, it was not shown that outcome indicators are in place that are consistent with avoiding, minimizing, or mitigating the impact on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification (i.e. pots). For example, there are no spatial analyses available which would allow an estimation of current and historic overlap of AIGKC pot fishing effort with the distribution of vulnerable coral and sponge habitats in the Aleutian Islands. The AIGKC unit of certification was therefore assigned a medium confidence rating for clause 12.13 and, consequently, a minor non-conformity was raised at re-assessment (SAI Global 2017). The minor non-conformance is now being addressed through a Corrective Action Plan that was developed by the Bering Sea Crab Client Group and which was accepted by the assessment team and incorporated into the re-assessment report.

**Fundamental Clause 13: Fisheries enhancement activities (where applicable)****Evidence adequacy rating: NA**

NA



## 7. Conformity Statement

The assessment team recommends that continued Certification under the Alaska Responsible Fisheries Management Certification Program is maintained for the management system of the U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow Crab commercial fisheries [Bristol Bay Red King Crab (*Paralithodes camtschaticus*), St. Matthew Island Blue King Crab (*Paralithodes platypus*), Eastern Bering Sea Tanner Crab (*Chionoecetes bairdi*), Aleutian Islands Golden King Crab (*Lithodes aequispinus*), and Eastern Bering Sea Snow Crab (*Chionoecetes opilio*) legally employing pot gear within the U.S. EEZ off Alaska.

## 8. Evaluation of Fundamental Clauses

### 8.1. Section A. The Fisheries Management System

#### 8.1.1. Fundamental Clause 1

There shall be a structured and legally mandated management system based upon and respecting International, National and local fishery laws, for the responsible utilization of the stock under consideration and conservation of the marine environment.

<b>Number of Supporting clauses</b>	<b>13</b>
<b>Supporting clauses applicable</b>	<b>6</b>
<b>Supporting clauses not applicable</b>	<b>7</b>
<b>Overall level of conformity</b>	<b>Full Conformity</b>
<b>Non Conformances</b>	<b>0</b>

#### Summarized evidence:

1.1. There shall be an effective legal and administrative framework established at local and national level appropriate for the fishery resource and conservation and management.

There is a structured and legally mandated management system in place for the BSAI king and Tanner Crab fisheries. Alaska's BSAI crab stocks are managed under the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs (FMP). The crab FMP was developed under a negotiated agreement between the State of Alaska and the federal government. The result was a state/federal fishery management plan (FMP) which incorporated concerns of the NPFMC, NMFS and MSA requirements on the federal side and ADFG, the BOF and Alaska statutes on the state side. This balance resulted in true Joint management where the needs of both Alaska residents and those from other states were met. The crab FMP has three categories of regulations which reflect the state and federal emphasis. Once the state and federal agencies and the BOF and NPFMC arrived at consensus and put the joint management document to public review, it was submitted to the Secretary of Commerce who accepted joint management for the BSAI crab fisheries. The management system and the fishery continue to operate in compliance with applicable law including the MSA.

1.2. Management measures shall take into account the whole stock unit over its entire area of stock distribution.

As detailed previously in the BSAI Crab RFM Re-assessment Report<sup>2</sup>, management measures consider the whole stock biological unit over its entire area of distribution, the area through which the species migrates during its life cycle, and other biological characteristics of the stock. The Council and NMFS produce annually a Stock Assessment & Fishery Evaluation (SAFE) report<sup>3</sup> covering all crab stocks within the BSAI King and Tanner Crab Fishery Management Plan (FMP), including each of the five stocks under consideration here. Both state and federal assessment biologists meet at the NPFMC Plan Team meetings and share assessment information and harvest strategies to assure conservation management over the entire stock distribution. No new information has come to light since re-assessment (e.g. population genetic research or tagging studies) that would indicate a need to revise the current understanding of crab stock unit structure.

1.3./1.4/1.5./1.6. Transboundary stocks

The five stocks under assessment are not considered shared, straddling, high seas or highly migratory stocks, nor are they considered common shared resources exploited by two or more States. As such, the following six supporting clauses are not applicable: 1.3, 1.3.1, 1.4, 1.4.1, 1.5 and 1.6.1. With respect to supporting clause 1.6, an updated rationale is provided below.

<sup>2</sup> <https://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-crab/>

<sup>3</sup> <https://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports/>

With respect to continuing conformity with supporting clause 1.6, there is evidence for well-established means by which fisheries management activities, organizations and arrangements are financed, including arrangements aiming to recover the costs of fisheries conservation, management and research. Specific costs incurred during management, research and enforcement of BSAI crab fisheries are largely funded through Congressional appropriations for federal programs. The State of Alaska also receives some funding from NMFS, in addition to funding from the Alaska Legislature. The Crab Observer Program is funded through industry funds as well as Test Fish funding sources. The Crab Observer Oversight Task Force (COOTF) is an advisory body comprised of crab industry members, including representative stakeholders. Its purpose is to review and recommend specific actions to Board of Fisheries on all aspects of the BSAI crab observer program including funding mechanisms for observers as well as budget and reserve priorities (RC 020<sup>4</sup>, March 2014). In 2017 the Board of Fisheries determined that the COOTF was useful and should continue (RC 033<sup>5</sup>, March 2017).

Research and management efforts are also supported by industry. For example, the Bering Sea Fisheries Research Foundation (BSFRF<sup>6</sup>) - a non-profit research foundation whose funding comes primarily from private industry - has engaged in cooperative research with industry, ADFG, and NMFS since 2005 with the aim of improving the science used to manage Bering Sea crab fisheries. Recent BSFRF research projects include *Chionoecetes* collection efforts for growth study and side-by-side trawl survey. BSFRF presented an update on results from the side-by-side trawl survey at a recent meeting of the Crab Plan Team (CPT Report, October 2018<sup>7</sup>).

#### 1.7. Review and Revision of conservation and management measures

The NPFMC and Alaska BOF have procedures in place to ensure continuous review of the efficacy of conservation and management measures. Mechanisms exist to revise or abolish current management measures in light of new information. For example, the Magnuson-Stevens Act (MSA) requires Regional Fishery Management Councils 1852(f)(5) to “review on a continuing basis, and revise as appropriate, the assessments and specifications made pursuant to section 1853(a)(3) and (4) of this title with respect to the optimum yield...”

#### 1.8. Transparent management arrangements and decision making

The NPFMC and Alaska BOF processes are organized in a highly transparent manner in terms of both management arrangements and decision-making processes. The Council provides a great deal of information on their website<sup>8</sup>, including meeting agendas, discussion papers, and records of decisions. The Council actively encourages stakeholder participation, and all Council deliberations are conducted in open, public session. The Council’s Three Meeting Outlook outlines issues likely to be of concern and therefore likely to be discussed at the following three NPFMC meetings, affording stakeholders the opportunity to prepare and submit comments for discussion in advance of meetings.

Similar to NPFMC, Alaska’s Board of Fisheries (BOF) management arrangements and decision-making processes for the fishery are organized in a highly transparent manner. The Board and ADFG provide a great deal of information on their websites<sup>9</sup>, including agenda of meetings, discussion papers, news items, and records of decisions. The BOF actively encourages stakeholder participation with deliberations conducted in open, public session. Anyone may submit regulatory proposals, and all such proposals are given due consideration by the BOF.

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<sup>4</sup> [https://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2013-2014/statewide/rcs/rc020\\_Bering\\_Sea\\_Aleutian\\_Is\\_Crab\\_Observer\\_Oversight.pdf](https://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2013-2014/statewide/rcs/rc020_Bering_Sea_Aleutian_Is_Crab_Observer_Oversight.pdf)

<sup>5</sup> [http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2016-2017/statewide/rcs/rc033\\_BOF\\_Crab\\_Observer\\_Task\\_Force.pdf](http://www.adfg.alaska.gov/static/regulations/regprocess/fisheriesboard/pdfs/2016-2017/statewide/rcs/rc033_BOF_Crab_Observer_Task_Force.pdf)

<sup>6</sup> <http://www.bsfrf.org/>

<sup>7</sup> <http://meetings.npfmc.org/CommentReview/DownloadFile?p=f5198732-ca4f-47e1-a4c1-e59b0ec553c1.pdf&fileName=C1%20Crab%20Plan%20Team%20report%200918.pdf>

<sup>8</sup> <https://www.npfmc.org/>

<sup>9</sup> <http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main>

1.9. Compliance with international conservation and management measures

The crab fisheries under consideration are prosecuted exclusively within waters of the U.S. EEZ and State of Alaska. These fisheries do not occur on the high seas. As such, supporting clause 1.9 is not applicable.

### 8.1.2. Fundamental Clause 2

Management organizations shall participate in coastal area management institutional frameworks, decision-making processes and activities related to the fishery and its users, in support of sustainable and integrated resource use, and conflict avoidance.

Number of Supporting clauses	10
Supporting clauses applicable	10
Supporting clauses not applicable	0
Overall level of conformity	Full Conformity
Non Conformances	0

#### Summarized evidence:

2.1./2.2./2.3./2.4. Policy, legal and institutional frameworks adopted to achieve sustainable and integrated use of marine resources along with mechanisms to avoid conflict shall be in place. Representatives of the fisheries sector and fishing communities shall be consulted in decision making processes and information related to management measures shall be disseminated.

A framework comprised of policy, legal and institutional capacities is in place to achieve sustainable and integrated use of marine resources and this framework provides for mechanisms to avoid conflict among users. The NMFS and the NPFMC participate in coastal area management-related institutional frameworks through the federal National Environmental Policy Act (NEPA) processes. This occurs whenever resources under their management may be affected by other developments and each time they create, renew or amend regulations. The fishery management agencies have processes, committees and groups that allow potential coastal zone developments and issues to be brought to formal review and engagement such as the NPFMC meetings or the BOF meetings.

Representatives of the fisheries sector and fishing communities are consulted in decision making processes and information related to management measures is disseminated. The Council and the BOF actively encourage stakeholder participation, and all their deliberations are conducted in open, public sessions. Decisions are transparently documented on the respective websites of these organizations<sup>10,11</sup> in a timely manner.

Information related to management measures is disseminated in a timely manner. For example, ADFG regularly publishes and distributes booklets summarizing current regulations (e.g. the 2017-2019 King and Tanner Crab Commercial Fishing Regulations; ADFG 2017) which are also made available online<sup>12</sup>. The NPFMC publicly disseminates information related to management measures on its website by providing up-to-date content about current and future meetings, current issues, and Council publications.

2.5. The economic, social and cultural value of coastal resources shall be assessed in order to assist decision-making on their allocation and use.

Assessment of the economic, social and cultural value of Alaskan fisheries is an integral part of the decision-making process for management of coastal resources. The primary job of the NPFMC and the BOF is to manage fisheries resources sustainably and to determine the allocation of resources to different users in accordance with provisions of the Magnuson-Stevens Act (MSA).

Alaska Fisheries Science Center (AFSC) runs the Economic and Social Sciences Research (ESSR) Program in Alaska<sup>13</sup>.

<sup>10</sup> <http://www.adfg.alaska.gov/index.cfm?adfg=fisheriesboard.main>

<sup>11</sup> <https://www.npfmc.org/>

<sup>12</sup> [http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/2017-2020\\_cf\\_king\\_tanner\\_crab.pdf](http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/2017-2020_cf_king_tanner_crab.pdf)

<sup>13</sup> <https://www.afsc.noaa.gov/REFM/Socioeconomics/Default.php>

The aim of the ESSR Program is to provide economic and sociocultural information to assist NMFS in meeting its stewardship responsibilities with activities being conducted in support of this mission. AFSC maintains online access to community profiles of baseline socioeconomic information for 136 Alaska communities most involved in commercial fisheries. Comprehensive community profiles, concise snapshots and searchable maps of communities involved in commercial, recreational and subsistence fishing may be found on the AFSC website<sup>14</sup>. AFSC has also recently published a wholesale market profile for Alaska groundfish and crab (AFSC 2016).

Many of the activities of the AFSC Program are conducted in collaboration with other Federal and State agencies and universities. Current research topics being addressed include regional economic impact models, behavioural models of fishing operations, indicators of economic performance, and the non-market valuation of living marine resources.

Additional information about the value of coastal resources comes from the Alaska Fisheries Information Network (AKFIN). AKFIN was established in 1997 in response to an increased need for detailed, organized fishery information to aid decision-making by managers with the aims of consolidating, managing and dispensing information related to commercial fishing in Alaska<sup>15</sup>. The AKFIN maintains an analytic database of both State and Federal historic, commercial Alaska fisheries data relevant to the needs of fisheries analysts and economists and provides that data in a usable format. These data are essential for, among other things, assessing the economic value of the Alaska seafood industry (McDowell Group 2017<sup>16</sup>).

Assessment results are presented annually in Economic Stock Assessment and Fishery Evaluation (Economic SAFE; Garber-Yonts and Lee 2017<sup>17</sup>) reports together with comprehensive information on stock assessments and updates on ecosystem status and trend (Ecosystem SAFE).

#### 2.6./2.7/2.8. Research and monitoring of the coastal environment, mechanisms for cooperation and coordination, appropriate technical capacities and financial resources, conflict avoidance amongst user groups

State and Federal agencies coordinate ongoing research and monitoring programs for the coastal environment. There are well-established multidisciplinary research programs to assess physical, chemical, biological, economic and social aspects of the coastal area which contribute to improved management. As detailed in the BSAI Crab Re-assessment Report<sup>18</sup>, the NPFMC, NMFS and ADFG are engaged monitoring of coastal resources either during the NEPA review of plan amendments or during their on-going studies and evaluations. Other State and federal entities also cooperate at the sub-regional level via NEPA processes in order to improve coastal area management. These entities include: Alaska Department of Environmental Conservation (ADEC); Alaska Department of Natural Resources (ADNR); DNR Office of Project Management and Permitting (OPMP); U.S. Fish and Wildlife Service (USFWS); and Bureau of Ocean Energy Management (BOEM), as well as the North Pacific Research board (NPRB) and Institute of Marine Science (IMS) of the UAF's School of Fisheries and Ocean Science.

There are well-established mechanisms for domestic cooperation and coordination that are secured by appropriate technical capacities and financial resources. For example, State and federal management authorities have established a framework for management of artificial reefs and fish aggregation devices in the coastal waters of Alaska. These management systems require approval for the construction and deployment of such reefs and devices, and management takes into account the interests of fishers, including artisanal and subsistence fishers.

<sup>14</sup> <https://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communities/>

<sup>15</sup> <https://akfin.psmfc.org/>

<sup>16</sup> <https://www.mcdowellgroup.net/wp-content/uploads/2017/10/ak-seafood-impacts-sep2017-final-digital-copy.pdf>

<sup>17</sup> [https://www.afsc.noaa.gov/REFM/Socioeconomics/SAFE/crab\\_safe/Crab\\_Economic\\_SAFE\\_2017.pdf](https://www.afsc.noaa.gov/REFM/Socioeconomics/SAFE/crab_safe/Crab_Economic_SAFE_2017.pdf)

<sup>18</sup> <https://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-crab/>

Mechanisms for international cooperation and coordination are in place as well. If an incident were to occur with potential for adverse environmental effects (e.g. oil spill, escape of an invasive species), there are management systems and action plans in place for response and containment. Additionally, there are systems to ensure the early sharing of information with the relevant Canadian authorities should such events have the potential for spill-over impacts on Canadian waters.

### 8.1.3. Fundamental Clause 3

Management objectives shall be implemented through management rules and actions formulated in a plan or other framework.

Number of Supporting clauses	7
Supporting clauses applicable	7
Supporting clauses not applicable	0
Overall level of conformity	Full Conformity
Non Conformances	0

#### Summarized evidence:

3.1. Long-term management objectives shall be translated into a plan or other management document and be subscribed to by all interested parties.

Long-term objectives for the fishery are outlined in the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs (NPFMC 2011)<sup>19</sup>. FMP objectives are dictated by, and consistent with, the Magnuson-Stevens Act (MSA)<sup>20</sup>. Management decisions are made by the Council and BOF, and implemented and enforced by AWT, NMFS-OLE and USCG (see discussion of enforcement under clause 10). Both NPFMC and ADFG make Council and Board deliberation and associated records publicly available on their websites. The decision-making processes of both agencies are extremely transparent and inclusive of all stakeholders, thereby ensuring that the plan is subscribed to by all interested parties

3.2. Management measures should limit excess fishing capacity, promote responsible fisheries, take into account artisanal fisheries, protect biodiversity and allow depleted stocks to recover.

Conservation and management measures ensure that excess fishing capacity is avoided and exploitation of the stocks remains economically viable. With a Congressionally approved approach creating Processor Quota Shares and Individual Fishing Quotas for rationalized crab fisheries in the BSAI in 2005, the numbers of buyers and sellers were capped, seasons were protracted and vessels were able to join cooperatives that resulted in fewer vessels deploying less gear on the grounds. The economic conditions under which fishing industries operate promote responsible fisheries, and these circumstances are actively reviewed and demonstrated in various analysis by NMFS<sup>21</sup>. NPFMC recently contracted a ten-year review of the effectiveness of crab rationalization<sup>22</sup> which was approved by the Council in 2016 (D. Stram, pers. comm.). Authors of the CR review concluded that the extent to which crab harvesting and processing capacity was reduced [since CR Program implementation] is measurable, and fairly objective when considered in terms of the number of vessels and processing facilities that have participated in program fisheries over time.

ADFG also track ex-vessel value of the fisheries they manage, and produce Annual Management Reports that support the analysis. Decisions are based on both biological and socio-economic information collected and analysed by NPFMC, NMFS and ADFG staff economists that participate in the economic, social and cultural evaluation and review process of fishery management proposals. Allocation also considers subsistence and community development initiatives.

<sup>19</sup> <https://www.npfmc.org/wp-content/PDFdocuments/fmp/CrabFMPOct11.pdf>

<sup>20</sup> <https://www.law.cornell.edu/uscode/text/16/chapter-38/subchapter-IV>

<sup>21</sup> <https://www.afsc.noaa.gov/refm/Socioeconomics/SAFE/crab.php>

<sup>22</sup> [https://www.npfmc.org/wp-content/PDFdocuments/catch\\_shares/Crab/Crab10yrReview\\_Final2017.pdf](https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/Crab/Crab10yrReview_Final2017.pdf)



## 8.2. Section B. Science and Stock Assessment Activities

### 8.2.1. Fundamental Clause 4

There shall be effective fishery data (dependent and independent) collection and analysis systems for stock management purposes.

<b>Number of Supporting clauses</b>	<b>13</b>
<b>Supporting clauses applicable</b>	<b>7</b>
<b>Supporting clauses not applicable</b>	<b>6</b>
<b>Overall level of conformity</b>	<b>Full Conformity</b>
<b>Non Conformances</b>	<b>0</b>

#### Summarized evidence:

#### 4.1. All fishery removals and mortality of the target stock(s) shall be considered by management.

All fishery removals and mortality of the target stocks is considered by management. ADFG undertakes a comprehensive, annual monitoring program to collect data on retained catch, bycatch/discards in all BSAI directed crab fisheries as well as crab bycatch/discards in all groundfish fisheries. Collectively, these monitoring and observer programs provide the basis for reliable estimation of total removals from all crab stocks annually for assessment and management purposes. Complete and reliable statistics are compiled on catch and fishing effort and subjected to rigorous statistical analysis in each annual stock assessment. Research results have been used as a basis for the setting of management objectives, reference points and performance criteria, as well as for annual adjustment of allowable catch levels. Historical and most recent data are available in the 2018 crab stock assessments report<sup>2324</sup>.

#### 4.2. An observer scheme designed to collect accurate data for research and support compliance with applicable fishery management measures shall be established.

A scheme of at-sea and dock-side observers is established to collect accurate data for research and support compliance with applicable fishery management measures. Historical and most recent data are available in the 2018 crab stock assessments report<sup>2526</sup>.

#### 4.3. Management entities shall make data available in a timely manner and in an agreed format in accordance with agreed procedures.

Data collected as part of 4.1 and 4.2 above are made available as required to conduct annual assessments of all BSAI crab stocks. Policies and procedures are prescribed at the federal and state levels to protect the confidentiality of data submitted to and collected by employees and contractors. Only authorized users have access to confidential data to perform an official duty<sup>2728</sup>.

<sup>23</sup> <http://www.adfg.alaska.gov/FedAidPDFs/FDS14-49.pdf>

<sup>24</sup> <http://www.npfmc.org/SAFE/CrabSAFE/2018CrabSAFE.pdf>

<sup>25</sup> <http://www.adfg.alaska.gov/FedAidPDFs/FDS14-49.pdf>

<sup>26</sup> [http://www.afsc.noaa.gov/FMA/Manual\\_pages/MANUAL\\_pdfs/manual2015.pdf](http://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2015.pdf)

<sup>27</sup> [http://www.st.nmfs.noaa.gov/st1/recreational/documents/Intercept\\_Appendices/Appendix%20M%20031408%20NOAA%20administrative%20order%20216-100.pdf](http://www.st.nmfs.noaa.gov/st1/recreational/documents/Intercept_Appendices/Appendix%20M%20031408%20NOAA%20administrative%20order%20216-100.pdf)

<sup>28</sup> <http://www.adfg.alaska.gov/FedAidPDFs/SP12-14.pdf>

4.4/4.5. States shall stimulate the research required to support national policies related to fish as food and collect sufficient knowledge of social, economic and institutional factors relevant to the fishery in question to support policy formulation.

There is strong promotion of research into all aspects of seafood use by federal and state agencies and industry organizations that support national policies related to fish as food. Extensive knowledge of the economic, social, marketing and institutional aspects of the BSAI crab fisheries has been acquired through dedicated research. Annual collection and analysis of relevant data provide the basis for ongoing monitoring, analysis and policy formulation related to these aspects of the fisheries. The most recent information is available in the 2017 socioeconomic evaluation of these fisheries<sup>2930313233</sup>.

4.6. States shall investigate and document traditional fisheries knowledge and technologies, in particular those applied to small scale fisheries, in order to assess their application to sustainable fisheries conservation, management and development.

Traditional fisheries knowledge is obtained through ongoing opportunity for public/community input to the fisheries management process to ensure its application to sustainable fisheries conservation, management and development.

4.7. States conducting scientific research activities in waters under the jurisdiction of another State shall ensure that their vessels comply with the laws and regulations of that State and international law.

NA

4.8. States shall promote the adoption of uniform guidelines governing fisheries research conducted on the high seas.

NA

4.9/4.10/4.11. States shall promote and enhance the research capacities of developing countries, support (upon request) States engaged in research investigations aimed at evaluating stocks which have been previously un-fished or very lightly fished.

NA

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<sup>29</sup> <http://www.alaskaseafood.org/>

<sup>30</sup> <http://www.sfos.uaf/fitc/>

<sup>31</sup> <http://afdf.org/>

<sup>32</sup> <http://www.afsc.noaa.gov/REFM/Socioeconomics/Default.php>

<sup>33</sup> [http://www.afsc.noaa.gov/REFM/Socioeconomics/SAFE/crab\\_safe/Crab\\_Economic\\_SAFE\\_2017.pdf](http://www.afsc.noaa.gov/REFM/Socioeconomics/SAFE/crab_safe/Crab_Economic_SAFE_2017.pdf)

### 8.2.2. Fundamental Clause 5

There shall be regular stock assessment activities appropriate for the fishery, its range, the species biology and the ecosystem, undertaken in accordance with acknowledged scientific standards to support its optimum utilization.

<b>Number of Supporting clauses</b>	<b>7</b>
<b>Supporting clauses applicable</b>	<b>7</b>
<b>Supporting clauses not applicable</b>	<b>0</b>
<b>Overall level of conformity</b>	<b>Full Conformity</b>
<b>Non Conformances</b>	<b>0</b>

#### Summarized Evidence:

5.1 States shall ensure that appropriate research is conducted into all aspects of fisheries including biology, ecology, technology, environmental science, economics, social science, aquaculture and nutritional science. The research shall be disseminated accordingly. States shall also ensure the availability of research facilities and provide appropriate training, staffing and institution building to conduct the research, taking into account the special needs of developing countries.

A well-organized institutional framework is in place that conducts the research required for fishery management purposes. The BSAI crab fisheries are jointly managed by the NPFMC and the BOF under the Fishery Management Plan (FMP).<sup>34</sup> A requirement of the FMP is the production of an annual stock assessment and fishery evaluation (SAFE) report. For each stock/fishery, the SAFE report provides a detailed description of the data and methodology used in the stock assessment, any changes in approaches, the estimated status of the stocks in relation to pre-determined fisheries management reference points, advice on appropriate harvest levels, and an assessment of the relative success of existing state and federal fishery management programs.

Stock status criteria used in the assessment of BSAI crab stocks ensure more precautionary approaches to managing fisheries when uncertainty is high. None of the BSAI crab fisheries can be considered small scale or low value. Nevertheless, the assessment methodology and degree of reliability varies between stocks. Status determination criteria for these stocks are calculated using a five-tier system that accommodates varying levels of uncertainty of information. The five-tier system incorporates new scientific information and provides a mechanism to continually improve the status determination criteria as new information becomes available.

Well established institutions with qualified staff are in place that conduct research into all aspects of fisheries. Results are made available as needed to ensure that the best scientific evidence is used for fisheries conservation, management and development. The research branch of the NMFS Alaska Region is the Alaska Fisheries Science Center (ASFC).<sup>35</sup> Its mission is to plan, develop, and manage scientific research programs which generate the best scientific data available for understanding, managing, and conserving the region's living marine resources and the environmental quality essential for their existence. The Resource Assessment and Conservation Engineering (RACE) Division<sup>36</sup> comprises scientists from a wide range of disciplines whose function is to conduct quantitative fishery surveys and related ecological and oceanographic research to describe the distribution and abundance of commercially important fish and shellfish stocks in the region, and to investigate ways to reduce bycatch, bycatch mortality and the effects of fishing on habitat.

<sup>34</sup> <http://www.fakr.noaa.gov/npfmc/fishery-management-plans/crab.html>

<sup>35</sup> <http://www.afsc.noaa.gov/>

<sup>36</sup> <http://www.afsc.noaa.gov/race/default.php>

Resource Ecology and Fisheries Management (REFM) Division conducts research and data collection to support an ecosystem approach to management of fish and crab resources<sup>37</sup>. Division scientists evaluate how fish stocks, ecosystem relationships and user groups might be affected by fishery management actions and climate. The Habitat and Ecological Processes Research (HEPR) Program<sup>38</sup> develops scientific research that supports implementation of an ecosystem approach to fishery management.

5.2. The state of the stocks under management jurisdiction, including the impacts of ecosystem changes resulting from fishing pressure, pollution or habitat alteration shall be monitored.

There is well established research capacity to assess and monitor the effects of climate or environment change on BSAI crab stocks and their ecosystem, the state of these stocks and the impacts of ecosystem changes resulting from human activity. See 5.1 evidence summary. Annual Ecosystem SAFE documents provide a concise summary of the status of marine ecosystems in Alaska for stock assessment scientists, fishery managers, and the public. It provides detailed information and updates on the status and trends of ecosystem components as well as early signals of direct human effects that might warrant management intervention or to provide evidence of the efficacy of previous management actions.<sup>39</sup> The annual crab SAFE report includes a section on ecosystem considerations which provides information on ecosystem indicators which may have an impact on crab stocks. Also, monitoring of and research related to effects of pollution of the marine environment throughout Alaska is an ongoing priority for AFSC and various State agencies.<sup>40</sup>

5.3. Management organizations shall cooperate with relevant international organizations to encourage research in order to ensure optimum utilization of fishery resources.

There is extensive international collaboration/cooperation that encourages research to ensure optimum utilization of BSAI crab resources. Research output on BSAI crab stocks is regularly published in the scientific literature and presented/discussed at relevant international conferences and symposia<sup>41</sup>. Scientists participate in meetings of different organizations involving attendees from various countries, including, for example, the North Pacific Marine Science Organization (PICES)<sup>42</sup>, which has members from the US, Russia, Japan and Canada, to exchange and discuss the latest results and advances stock assessment science and management of fishery resources.

5.4. The fishery management organizations shall directly, or in conjunction with other States, develop collaborative technical and research programs to improve understanding of the biology, environment and status of trans-boundary aquatic stocks.

Although the BSAI crab are not trans-boundary stocks, the United States and Russia share many important stocks of living marine resources in the North Pacific Ocean and Bering Sea, lending importance to coordination of efforts of the two countries to conserve and manage those resources. On May 31, 1988 the United States and Russia signed the “Agreement Between the Government of the United States of America and the Government of the Union of Soviet Socialist Republics on Mutual Fisheries Relations”, establishing the U.S.-Russia Intergovernmental Consultative Committee.<sup>43</sup> The main objective of the Agreement is to maintain a fisheries relationship that benefits both countries. The United States and Russia cooperate on scientific research, consult on fisheries matters beyond their EEZs and beyond the EEZ of any third party to ensure proper conservation and management, and cooperate

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<sup>37</sup> <http://www.afsc.noaa.gov/refm/default.php>

<sup>38</sup> <http://www.afsc.noaa.gov/HEPR/default.php>

<sup>39</sup> <https://access.afsc.noaa.gov/reem/ecoweb>

<sup>40</sup> [http://www.afsc.noaa.gov/ABL/Habitat/ablhab\\_contaminants.htm](http://www.afsc.noaa.gov/ABL/Habitat/ablhab_contaminants.htm)

<sup>41</sup> <http://www.pmel.noaa.gov/foci/publications>

<sup>42</sup> <http://www.pices.int/>

<sup>43</sup> [http://www.nmfs.noaa.gov/ia/agreements/bilateral\\_arrangements/russia/us-russia.html](http://www.nmfs.noaa.gov/ia/agreements/bilateral_arrangements/russia/us-russia.html)

to address Illegal, Unreported, and Unregulated (IUU) fishing activities. On April 29, 2013, the United States and Russia signed a Joint Statement on Enhanced Fisheries Cooperation, which reaffirms the 1988 Agreement while focusing future cooperation on combating IUU fishing, collaborating on science and management of Arctic fisheries, and advancing conservation efforts in the Ross Sea region of Antarctica.

5.5. Data generated by research shall be analyzed and the results of such analyses published in a way that ensures confidentiality is respected, where appropriate.

Results of analysis of data from the BSAI crab fisheries that are generated both through the data collection programs for commercial fisheries and through research surveys and other research programs are published in reports of specific programs and the annual SAFE report describes how the various datasets have contributed to the assessment of the status of stocks. NOAA administrative order 216-100 prescribes policies and procedures for protecting the confidentiality of data submitted to and collected by NOAA/National Marine Fisheries Service<sup>44</sup>. Only authorized users have access to confidential data, they must have a need to collect or use these data in the performance of an official duty, and they must sign a statement of nondisclosure affirming their understanding of NMFS obligations with respect to confidential data and the penalties for unauthorized use and disclosure. All procedures applicable to Federal employees must be followed by contractors collecting data with Federal authority. Under agreements with the State, each State data collector collecting confidential data will sign a statement at least as protective as the one signed by Federal employees

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<sup>44</sup>[http://www.st.nmfs.noaa.gov/st1/recreational/documents/Intercept\\_Appendices/Appendix%20M%20031408%20NOAA%20administrative%20order%20216-100.pdf](http://www.st.nmfs.noaa.gov/st1/recreational/documents/Intercept_Appendices/Appendix%20M%20031408%20NOAA%20administrative%20order%20216-100.pdf)

### 8.3. Section C. The Precautionary Approach

#### 8.3.1. Fundamental Clause 6

The current state of the stock shall be defined in relation to reference points or relevant proxies or verifiable substitutes allowing for effective management objectives and targets. Remedial actions shall be available and taken where reference point or other suitable proxies are approached or exceeded.

Number of Supporting clauses	4
Supporting clauses applicable	4
Supporting clauses not applicable	0
Overall level of conformity	Medium Conformity
Non Conformances	1

#### Summarized Evidence:

6.1/6.2/6.3/6.4 States shall determine for the stock both safe targets for management (Target Reference Points) and limits for exploitation (Limit Reference Points), shall measure the status of the stock against these reference points and agree to actions to be undertaken if reference points are exceeded.

Safe target reference points have been established for management of BSAI crab fisheries. The FMP<sup>45</sup> contains the following stock status definitions: Acceptable biological catch (ABC) is a level of annual catch of a stock that accounts for the scientific uncertainty in the estimate of OFL and any other specified scientific uncertainty and is set to prevent, with a greater than 50 percent probability, the OFL from being exceeded. The ABC is set below the OFL. ABC Control Rule is the specified approach in the five-tier system for setting the maximum permissible ABC for each stock as a function of the scientific uncertainty in the estimate of OFL and any other specified scientific uncertainty. Annual catch limit (ACL) is the level of annual catch of a stock that serves as the basis for invoking accountability measures. For EBS crab stocks, the ACL will be set at the ABC. Total allowable catch (TAC) is the annual catch target for the directed fishery for a stock, set to prevent exceeding the ACL for that stock and in accordance with section 8.2.2 of the FMP. Guideline harvest level (GHL) means the preseason estimated level of allowable fish harvest which will not jeopardize the sustained yield of the fish stocks. A GHL may be expressed as a range of allowable harvests for a species or species group of crab for each registration area, district, sub district, or section. Maximum sustainable yield (MSY) is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions. MSY is estimated from the best information available. For crab stocks, the OFL equals the maximum sustainable yield (MSY). FMSY control rule means a harvest strategy which, if implemented, would be expected to result in a long term average catch approximating MSY. BMSY stock size is the biomass that results from fishing at constant FMSY and is the minimum standard for a rebuilding target when a rebuilding plan is required. Maximum fishing mortality threshold (MFMT) is defined by the FOFL control rule, and is expressed as the fishing mortality rate. Minimum stock size threshold (MSST) is one half the BMSY stock size.

Overfished is determined by comparing annual biomass estimates to the established MSST. For stocks where MSST (or proxies) are defined, if the biomass drops below the MSST (or proxy thereof) then the stock is considered to be overfished. Overfishing is defined as any amount of catch in excess of the overfishing level (OFL). The OFL is calculated by applying abundance estimates to the FOFL control rule. Status determination criteria for crab stocks are annually calculated using a five-tier system that accommodates varying levels of uncertainty of information.

<sup>45</sup> <http://www.fakr.noaa.gov/npfmc/fishery-management-plans/crab.html>

If overfishing occurred or the stock is overfished, section 304(e)(3)(A) of the Magnuson-Stevens Act, as amended, requires the NPFMC to immediately end overfishing and rebuild affected stocks.

The MSA also requires that Fishery Management Plans (FMPs) incorporate accountability measures to prevent the ACL from being exceeded and to correct any excesses in ACLs if they do occur. Accountability measures could include seasonal, area and gear allocations, closed areas, bycatch limits, in-season fishery closures, gear restrictions, limited entry, catch shares and observer and vessel monitoring requirements. All such measures are designed to allow close monitoring of catch levels from all sources, to react to specific bycatch problems and to provide a database for evaluating potential consequences of future management actions.

Under the BSAI crab FMP, specific accountability measures that have been used to prevent the ACL being exceeded include individual fishing quotas (IFQs) and measures to ensure IFQs are not exceeded, measures to minimize bycatch in the directed crab fisheries and monitoring and catch accounting measures. In addition, the ACL and TAC have been reduced if the ACL was exceeded in the previous fishing year

### Supporting Clause 6.3

**Note as this Clause has scored less than Full Conformance it has been scored in full.**

Data and assessment procedures shall be installed measuring the position of the fishery in relation to the reference points. Accordingly, the stock under consideration shall not be overfished (i.e. above limit reference point or proxy) and the level of fishing permitted shall be commensurate with the current state of the fishery resources, maintaining its future availability, taking into account that long term changes in productivity can occur due to natural variability and/or impacts other than fishing.

FAO CCRF (1995) 7.5.3, 7.6.1

FAO Eco (2009) 29.2-29.2bis, 29.6, 30-30.2

FAO Eco (2011) 36.2, 36.3, 37, 37.1, 37.2

<b>Evidence Rating:</b>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>
<b>Non-Conformance:</b>	Critical <input type="checkbox"/>	Major <input type="checkbox"/>	Minor <input checked="" type="checkbox"/>
			None <input type="checkbox"/>

#### Summary Evidence:

**Procedures are in place to measure the position of BSAI crab fisheries in relation to their reference points and measures are in place to ensure they are not overfished or being overfished and take into account long term changes in productivity or impacts other than fishing.**

#### Evidence:

Details of the foregoing and the most recent stock assessment for BSAI crab stocks can be found in the 2017 SAFE report.<sup>46</sup> Summaries for the five stocks under consideration in this surveillance audit follow.

#### Eastern Bering Sea Snow Crab

##### Fishery information relative to OFL setting

Total catch mortality in 2016/17 was 11,000 t (with discard mortality rates applied), while the retained catch in the directed fishery was 9,700 t (Table 3). This was below the 2016/17 OFL of 23,700 t. Snow Crab bycatch occurs in the directed fishery and to a lesser extent in the groundfish trawl fisheries. Estimates of trawl bycatch in recent years are less than 1% of the total Snow Crab catch. Estimates of stock status were above the BMSY proxy for this

<sup>46</sup> <https://www.npfmc.org/fishery-management-plan-team/bsai-crab-plan-team/#currentcrab>

stock (B35%) in 2010/11-2012/13, but below the BMSY proxy more recently. For 2017/18, the ratio of projected MMB (99.6 t) fishing at the FOFL to BMSY (139,400 t) remains less than 1 but above 0.5.

**Table 3.** Historical status and catch specifications for Snow Crab (thousand t). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2014/15	78.9	168.0	30.8	30.8	34.3	69.0	62.1
2015/16	75.8	91.6	18.4	18.4	21.4	83.1	62.3
2016/17	75.8	96.1	9.7	9.7	11.0	23.7	21.3
2017/18	71.4	99.6	8.6	8.6	10.5	28.4	22.7
2018/19		123.1				29.7	23.8

#### Stock biomass and recruitment trends

Survey mature male biomass based on a maturity ogive decreased from 167,100 t in 2011 to 97,500 t in 2013, increased to 163,500 t in 2014, fell to 63,200 t in 2016, and increased to 84,000 t in 2017 and 198,400 t in 2018. The 2018 survey mature male biomass is the largest since 1998. The 2018 model estimates of mature male biomass showed trends similar to survey biomass during 2011–2018, except that the model failed to match the 1-year spike in survey biomass observed in 2014 and was unable to match the high 2018 estimate. Observed survey mature female biomass rose quickly from 52,200 t in 2009 to 175,800 t in 2011, its highest value since 1991, decreased steadily to 55,400 t in 2016, then increased to 106,800 t in 2017 and to 165,900 t in 2018. Compared to the 2016 assessment, the model fits the abundance estimates quite closely from 2010. The increase in biomass is driven by high estimates of recruitment for 2014/15.

#### Stock Status

The CPT recommends that the EBS Snow Crab is a Tier 3 stock so the OFL will be determined by the FOFL control rule using F35% as the proxy for FMSY. The proxy for BMSY (B35%) is the mature male biomass at mating (142,800 t) based on average recruitment over 1982 to 2017. Consequently, the minimum stock size threshold (MSST) is 71,400 t. The MMB is above MSST in 2017/18 therefore the stock is not overfished. Catch was below the OFL in 2017/18 therefore overfishing did not occur.

#### **Bristol Bay Red King Crab**

##### Fishery information relative to OFL setting

The commercial harvest of Bristol Bay Red King Crab (BBRKC) dates to the 1930s. The fishery was initially prosecuted mostly by foreign fleets but shifted to a largely domestic fishery in the early 1970s. Retained catch peaked in 1980 58,900 t, but harvests dropped sharply in the early 1980s, and population abundance has remained at relatively low levels over the last two decades compared to those seen in the 1970s. The fishery is managed for a total allowable catch (TAC) coupled with restrictions for sex (males only), a minimum size for legal retention (16.5 cm carapace width; 13.5 cm carapace length is used a proxy for 16.5 cm carapace width in the assessment), and season (no fishing during mating/molting periods). In addition to the retained catch that occurs during the commercial fishery, which is limited by the TAC, there is also retained catch that occurs in the ADFG cost-recovery fishery.

The current SOA harvest strategy allows a maximum harvest rate of 15% of mature-sized ( $\geq 120$  mm CL) males, but also incorporates a maximum harvest rate of 50% of legal males and a threshold of 3,810 t mature-sized ( $\geq 90$  mm CL) females and 6,577 t of effective spawning biomass (ESB), to prosecute a fishery. Annual non-retained catch of female and sublegal male RKC during the fishery averaged less than 8,600 t since data collection began



in 1990. Total catch (retained and bycatch mortality) increased from 7,600 t in 2004/05 to 10,600 t in 2007/08 but has decreased since then; retained catch in 2017/18 was 3,090 t and total catch mortality was 3,480 t.

**Table 4.** Historical status and catch specifications for Bristol Bay Red King Crab (thousand t). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2014/15	13.03	27.25	4.49	4.54	5.44	6.82	6.14
2015/16	12.89	27.68	4.52	4.61	5.34	6.73	6.06
2016/17	12.53	25.81	3.84	3.92	4.28	6.64	5.97
2017/18	12.74	24.86	2.99	3.09	3.48	5.60	5.04
2018/19		20.80				5.34	4.27

#### Stock biomass and recruitment trends

Based on the CPT-recommended scenario, 18.0a, the MMB at the time of mating is estimated to have been highest early in the late 1970s (approximately 111,000 t), with secondary peaks in 1989 (28,000 t) and 2002-3 and 2010-11 (~31,000 t). The estimated MMB at time of mating in 2017/8 was 24,860 t, the lowest in 1998 (23,410 t). The projection for the 2018/19 time of mating, which assumes the fishing mortality in 2018/19 matches that corresponding to the OFL, is 20,800 t. Estimates of recruitment since 1985 have been generally low relative to those estimated for the period prior to 1985 and intermittent peaks in 1995, 2002, and 2005 (56, 53, and 43 million crab, respectively). The relatively low recruitment estimate of 14.6 million crab for 2018 was, however, the largest since 2011 (16.0 million crab).

#### Stock Status

MMB for 2017/18 was estimated to be 24,860 t and above MSST (12,740 t); hence the stock was not overfished in 2017/18. The total catch in 2017/18 (3,480 t) was less than the 2017/18 OFL (5,600 t); hence overfishing did not occur in 2017/18. The stock at 2018/19 time of mating is projected to be above the MSST and 82% of *B35%*; hence the stock is not approaching an overfished condition in 2018/19.

### **Eastern Bering Sea Tanner Crab**

#### Fishery information relative to OFL setting

Eastern Bering Sea (EBS) Tanner Crab are caught in directed Tanner Crab fisheries, as bycatch in the groundfish fisheries, scallop fisheries, as bycatch in the directed Tanner Crab fishery (mainly as non-retained females and sublegal males), and other crab fisheries (notably, eastern Bering Sea Snow Crab and, to a lesser extent, Bristol Bay Red King Crab). A single OFL is set for Tanner Crab in the EBS. Under the Crab Rationalization Program, ADFG sets separate TACs for directed fisheries east and west of 166° W longitude. The mature male biomass was estimated to be below the Minimum Stock Size Threshold (0.5BMSY) in February 2010 (the assumed time of mating) based on trends in mature male biomass from the survey, and NMFS declared the stock overfished in September 2010. The directed fishery was closed from 2010/11 through 2012/13 crab fishery years.

NMFS determined the stock was not overfished in 2012 based on a new assessment model with a revised estimate of *BMSY*. The directed fishery was open for the 2013/14 to 2015/16 seasons with a total allowable catch (TAC) of 1,410 t in 2013/14, 6,850 t in 2014/15, and 8,920 t in 2015/16. The total retained catch in 2015/16 (8,910 t) was the largest taken in the fishery since 1992/93. In 2016/17, ADFG determined that mature female biomass did not meet the criteria for opening a fishery according to the regulatory harvest strategy, and the TAC was set at zero. Consequently, there was no directed harvest in 2016/17. In 2017/18, ADFG determined that a directed fishery could occur in the area west of 166°W longitude. The TAC was set at 1,130 t, of which 100% was taken.

**Table 5.** Historical status and catch specifications for Eastern Bering Sea Tanner Crab (thousand t). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2014/15	13.40	71.57	6.85	6.16	9.16	31.48	25.18
2015/16	12.82	73.93	8.92	8.91	11.38	27.19	21.75
2016/17	14.58	77.96	0.00	0.00	1.14	25.61	20.49
2017/18	15.15	64.09	1.13	1.13	2.37	25.42	20.33
2018/19		35.95				20.87	16.70

#### Stock biomass and recruitment trends

The MMB at the time of mating is estimated to have been highest early in the early 1970s (approximately 300 thousand t), with secondary peaks in 1989 (75,000 t), 2008 – 2009 (76,000 t), and in 2014 (83,000 t). The estimated MMB at time of mating in 2017/18 was 64,090 t and the projection for the 2018/19 time of mating is 35,950 t. Estimates of recruitment since 1999 have been generally low relative to the peaks estimated for the period prior to 1990. There was a relatively strong recruitment estimated for 2017 and 2018, but these estimates are very uncertain and will need to be confirmed by subsequent assessments.

#### Stock Status

Based on the estimated biomass at 15 February 2018, the stock is at Tier 3 level a. The *FMSY* proxy (*F*35%) is 0.74 yr<sup>-1</sup>, and the 2018/19 *FOFL* is 0.74 yr<sup>-1</sup> under the Tier 3 level a *OFL* Control Rule, which results in a total male and female *OFL* of 20,870 t. The MMB is above MSST in 2017/18 therefore the stock is not overfished. Catch was below the *OFL* in 2017/18 therefore overfishing did not occur.

### **St. Matthew Island Blue King Crab**

#### Fishery information relative to *OFL* setting

The fishery was prosecuted as a directed fishery from 1977 to 1998. Harvests peaked in 1983/84 when 4,288 t were landed by 164 vessels. Harvest was fairly stable from 1986/87 to 1990/91, averaging 568 t annually. Harvest increased to a mean catch of 1,496 t during the 1991/92 to 1998/99 seasons until the fishery was declared overfished and closed in 1999 when the stock size estimate was below the MSST. In November 2000, Amendment 15 to the FMP was approved to implement a rebuilding plan for the St. Matthew Island Blue King Crab stock. The rebuilding plan included a harvest strategy identified in regulation by the Alaska Board of Fisheries, an area closure to control bycatch, and gear modifications. In 2008/09 and 2009/10, the MMB was estimated to be above *BMSY* for two years and the stock declared rebuilt in 2009.

The fishery re-opened in 2009/10 with a TAC of 529 t and 209 t of retained catch were harvested (Table 6). The 2010/11 TAC was 726 t and the fishery reported a retained catch of 573 t. The 2011/12 harvest of 853 t represented 80% of the 1,152 t TAC. In 2012/13, by contrast, harvesters landed 99% (733 t) of a reduced TAC of 740 t, though fishery efficiency, at about 10 crab per pot, was little changed from what it had been in each of the previous three years. The directed fishery was closed in 2013/14 due to declining trawl survey estimates of abundance and concerns about the health of the stock. The directed fishery resumed again in 2014/15 with a TAC of 300 t, but the fishery performance was relatively poor with the retained catch of 140 t. The TAC in 2015/16 was 190 t with a retained catch of 47 t. The fishery has been closed since 2016/17. Bycatch of non-retained Blue King Crab has occurred in the St. Matthew Blue King Crab fishery, the eastern Bering Sea Snow Crab fishery, and trawl and fixed-gear groundfish fisheries. Based on observer data, bycatch of sublegal male and female crabs in the directed fishery off St. Matthew Island was relatively high in the 1990s, and total bycatch (in terms of number of crabs captured) was often twice as high or higher than total catch of legal crabs.

**Table 6.** Historical status and catch specifications for St. Mathew Blue King Crab (thousand t). Shaded values are new estimates or projections based on the current assessment. Other table entries are based on historical assessments and are not updated except for total and retained catch.

Year	MSST	Biomass (MMB)	TAC	Retained Catch	Total Catch	OFL	ABC
2014/15	1.84	2.48	0.30	0.14	0.15	0.43	0.34
2015/16	1.84	2.11	0.19	0.05	0.05	0.28	0.22
2016/17	1.97	2.23	0.00	0.00	0.05	0.14	0.11
2017/18	1.85	1.29	0.00	0.00	0.01	0.12	0.10
2018/19		1.31				0.04	0.03

#### Stock biomass and recruitment trends

Following a period of low values after the stock was declared overfished in 1999, trawl-survey indices of stock abundance and biomass generally increased to well above average during 2007–2012. In 2013 survey biomass declined (~40% of the mean value) but was followed by average biomass estimates in 2014 and 2015, but with survey CVs of 77% and 45%, respectively). The 2016 survey biomass fell to 3,485 t (with a CV of 39%), followed by continued declines to the 2018 survey estimate of 1,731 t (with a CV of 28%). This value represents 31% of the long term mean (mean of 5,664 t during 1978–2018) with the most recent 3-year average surveys at 41% of the historical mean, again indicating a general decline in biomass since 2010.

Because little information about the abundance of small crab is available for this stock, recruitment has been assessed in terms of the number of male crab within the 90–104 mm CL size class in each year. The 2018 trawl-survey area-swept estimate of 0.154 million males in this size class is the third lowest in the 41-year time series since 1978 and only 15% of the long-term average recruitment. The 2018 abundance of this size group was also the lowest in the pot survey time series and 10% of the time series average.

#### Stock Status

The stock assessment examines five model configurations: (1) 2017 Model - the 2017 recommended model without any new data added; (2) BTS – Model 1 with 2018 bottom trawl survey (BTS) data; (3) BTS and pot, “reference model” – Model 2 with 2018 ADFG pot survey data; (4) VAST - a geo-spatial delta-GLMM model to the BTS data; and not run in GMACS; and (5) Fit survey - an exploratory scenario that revises the reference model by reweighting the NMFS trawl and ADFG pot surveys by 2.0.

The CPT recommended to use the reference case model for the 2018/19 crab year. This stock is in Tier 4. The CPT recommended model uses the full assessment period (1978/79–2017/18) to define the proxy for *BMSY* in terms of average estimated *MMB<sub>maturing</sub>*.

The projected MMB estimated for 2018/19 under the recommended model is 1,310 t and the *FMSY* proxy is the natural mortality rate (0.18-1 year) and FOFL is 0.09, resulting in a mature male biomass OFL of 04 t. The MMB/*BMSY* ratio is 0.35.

The model results show that the stock was below MSST in 2017/18. Thus the stock is overfished.

Total catch was less than the OFL in 2017/18 and hence overfishing did not occur. The CPT discussed information that will be needed to develop a rebuilding plan if the stock is declared overfished.

As reported in the 2018 assessment (Zheng and Ianelli 2018), estimated total male catch is the sum of fishery reported retained catch, estimated male discard mortality in the directed fishery, and estimated male bycatch

mortality in the groundfish fisheries. Based on the reference model for SMBKC, the estimate for mature male biomass is below the minimum stock-size threshold (MSST) in 2017/18 and is hence in an “overfished” condition, despite fishery closures in the last two years (and hence overfishing has not occurred) (Table 1 and Table 2). Computations which indicate the relative impact of fishing (i.e. “dynamic B0”) suggests that the current spawning stock biomass has been reduced to 60% of what it would have been in the absence of fishing.

This new information about SMBKC stock status prompted the assessment team to re-score supporting clause 6.3:

*Data and assessment procedures shall be installed measuring the position of the fishery in relation to the reference points. Accordingly, the stock under consideration shall not be overfished (i.e. above limit reference point or proxy) and the level of fishing permitted shall be commensurate with the current state of the fishery resources, maintaining its future availability, taking into account that long term changes in productivity can occur due to natural variability and/or impacts other than fishing.*

The RFM Program provides assessment teams with guidance for scoring clause 6.3 which consists of three evaluation parameters: process; current status/appropriateness/effectiveness; and evidence basis. With respect to the first evaluation parameter, we find strong evidence of conformity because the Council process has been followed and the stock assessment was conducted according to procedure using the appropriate datasets to measure the position of the fishery in relation to its limit reference point (MSST). With respect to the third evaluation parameter, we find strong evidence of conformity because the stock assessment of SMBKC, as documented in the SAFE report, was based on high-quality information. With respect to the second evaluation parameter, however, we find that the stock under consideration (SMBKC) does not meet the RFM criterion for current status/appropriateness/effectiveness because the stock is below its limit reference point and therefore designated as ‘overfished’ (NMFS Letter to NPFMC, October 2018). Consequently, clause 6.3 is lacking in one evaluation parameter and must therefore be assigned a medium confidence rating. A minor non-conformity is raised.

### **Aleutian Islands Golden King Crab**

#### *Fishery information relative to OFL setting*

The directed fishery has been prosecuted annually since the 1981/82 season. Retained catch peaked in 1986/87 at 6,667 t. and averaged 5,397 t. over the 1985/86-1989/90 seasons. Average harvests dropped sharply from 1989/90 to 1990/91 to a level of 3,129 t. for the period 1990/91–1995/96. Management based on a formally established GHL began with the 1996/97 season. The 2,676 t GHL established for the 1996/97 season, which was based on the previous five-year average catch, was subsequently reduced to 2,585 t beginning in 1998/99. The GHL (or TAC, since 2005/06) remained at 2,585 t for 2007/08 but was increased to 2,714 t for the 2008/09-2011/12 seasons, and to 2,853 t starting with the 2012/13 season. The TAC was reduced to 2,515 t for the 2016/17 season. This fishery is rationalized under the Crab Rationalization Program.

Total mortality of AI Golden King Crab includes retained catch in the directed fishery, mortality of discarded catch, and bycatch in fixed-gear and trawl groundfish fisheries, though bycatch in other fisheries is low compared to mortality in the directed fishery. Retained catch in the post-rationalized fishery (2005/06-2016/17) has ranged from 2,379 t in 2006/07 to 2,893 in 2013/14 (Table 7). Total mortality ranged from 2,461 t to 3,085 t for the same period.

**Table 7.** Status and catch specifications (1000 t) of Aleutian Islands Golden King Crab.

Year	MSST	Biomass (MMB)	TAC	Retained Catch <sup>a</sup>	Total Catch <sup>a</sup>	OFL	ABC
2014/15	NA	NA	2.853	2.771	2.967	5.69	4.26
2015/16	NA	NA	2.853	2.729	2.964	5.69	4.26
2016/17	NA	NA	2.515	2.593	2.829	5.69	4.26
2017/18	6.044	14.205	2.515	2.585	2.942	6.048	4.536
2018/19		17.952				5.514	4.136

Stock biomass and recruitment trends

Estimated mature male biomass (MMB) for the EAG decreased from high levels until the 1990s after which the trend has been increasing. In contrast, the MMB for WAG increased from a low in the 1990s until 2007/08 and then declined again. There has been a slight increase in MMB in WAG in the last several years. Recruitment for the EAG is variable with a generally increasing trend while recruitment for WAG is lower in recent years than during the 1980s. However, recruitment in 2015 for WAG appears to be relatively strong. Stock trends reflected the fishery standardized CPUE trends in both areas.

Stock status

The stock is currently estimated to be above BMSY in both areas therefore no adjustment is needed to the FOFL to determine the combined for both areas. The MMB is above MSST in 2017/18 therefore the stock is not overfished. Catch was below the OFL in 2017/18 therefore overfishing did not occur.

**References:**

**Non-Conformance Number (if relevant)**

**#3 (new)**

### 8.3.2. Fundamental Clause 7

Management actions and measures for the conservation of stock and the aquatic environment shall be based on the precautionary approach. Where information is deficient a suitable method using risk assessment shall be adopted to take into account uncertainty.

Number of Supporting clauses	5
Supporting clauses applicable	4
Supporting clauses not applicable	1
Overall level of conformity	Full Conformity
Non Conformances	0

#### Summarized Evidence:

7.1. The precautionary approach shall be applied widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment.

The precautionary approach is applied to conservation, management and exploitation of the BSAI crab resources in order to protect them and preserve their environment. The MSA dictates the development of FMPs for all the federally managed/overseen fisheries. The NPFMC treats OFL (MSY) as an upper limit rather than a target. Catches are in line with the TAC and well below the OFL to take into account the risks involved when calculating MSY. As implemented in management of BSAI crab fisheries, the precautionary approach takes into account uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities on non-target and associated or dependent species as well as environmental and socio-economic conditions.

7.2. For new and exploratory fisheries, procedures shall be in place for promptly applying precautionary management measures, including catch or effort limits.

NA: there are no new and exploratory species.

## 8.4. Section D. Management Measures

### 8.4.1. Fundamental Clause 8

Management shall adopt and implement effective management measures designed to maintain stocks at levels capable of producing maximum sustainable yields, including harvest control rules and technical measures applicable to sustainable utilization of the fishery and be based upon verifiable evidence and advice from available scientific and objective, traditional sources.

<b>Number of Supporting clauses</b>	<b>17</b>
<b>Supporting clauses applicable</b>	<b>16</b>
<b>Supporting clauses not applicable</b>	<b>1</b>
<b>Overall level of conformity</b>	<b>Full Conformity</b>
<b>Non Conformances</b>	<b>0</b>

#### Summarized evidence:

8.1. Conservation and management measures shall be designed to ensure the long-term sustainability of fishery resources at levels which promote the objective of optimum utilization, and be based on verifiable and objective scientific and/or traditional sources. In the evaluation of alternative conservation and management measures, their cost-effectiveness and social impact shall be considered.

Conservation and management measures are in place to ensure the long-term sustainability of BSAI crab resources at levels which promote optimum utilization that are based on verifiable and objective scientific and traditional, fisher and community sources. The NPFMC's fishery management plan (FMP) for BSAI crab stocks outlines the stock status definitions, the criteria used to determine stock status using a five-tier system and the step-by-step framework under which the Council sets final overfishing levels (OFLs) and acceptable biological catches (ABCs). The MSA requires that the Science and Statistical Committee (SSC) of the NPFMC determines the scientific benchmarks while the Council itself recommends quotas based on these benchmarks. This separation of responsibilities is a key step forward in eliminating overfishing and enhancing recovery of overfished stocks.

In the evaluation of alternative conservation and management measures for BSAI crab fisheries, their cost-effectiveness and social impact are considered. Resource Ecology and Fisheries Management (REFM) Division at the NMFS AFSC conducts a program of research to support an ecosystem approach to management of BSAI crab stocks, examining climate and environmental changes as well as a socio-economic program whose work includes evaluating economic impacts of fisheries rationalization programs, and compiling and evaluating socio-cultural information on Alaskan communities and traditional ecological knowledge. Economic and ecosystem assessments provide a basis for scientific evaluation of how fish stocks, ecosystem relationships and user groups might be affected by fishery management actions and climate.

8.2. States shall prohibit dynamiting, poisoning and other comparable destructive fishing practices.

Dynamiting, poisoning and other comparable destructive fishing practices are prohibited in Alaska. The BSAI crab FMP authorizes the use of pot gear to harvest the crab resources.

8.3. States shall seek to identify domestic parties having a legitimate interest in the use and management of the fishery.

All domestic parties with a legitimate interest in the use and management of BSAI crab fisheries were identified as part of Crab Rationalization and the impact of the CR Program on these parties has been tracked over time (see Weidlich and Downs 2016)<sup>47</sup>. Recognition is given to the traditional practices, needs and interests of indigenous people and local fishing communities. Arrangements are in place to consult all interested parties to gain their collaboration in achieving responsible fisheries.

8.4. Mechanisms shall be established where excess capacity exists, to reduce capacity. Fleet capacity operating in the fishery shall be measured. States shall maintain, in accordance with recognized international standards and practices, statistical data, updated at regular intervals, on all fishing operations and a record of all authorizations to fish allowed by them.

Mechanisms are in place to reduce capacity to levels commensurate with sustainable use of the BSAI crab resources. Fleet capacity has been measured and is monitored. Statistics are updated regularly on all fishing operations and a record is maintained of all authorizations to fish these resources. BSAI crab fisheries are limited entry, rationalized fisheries. Fishing capacity has been reduced since 2002. Fleet consolidation accompanying rationalization was substantial and remaining vessel ownership has tended to aggregate in fewer and larger communities (see NPFMC 2017: Ten-Year Program Review for the Crab Rationalization Management Program in the Bering Sea/ Aleutian Islands<sup>48</sup>). The capacity of the crab fleet has been fixed since 2006 and participation has been continuously monitored by NMFS's Restricted Access Management Program (RAM)<sup>49</sup> and the Alaska Commercial Fisheries Entry Commission (CFEC).<sup>50</sup>

8.5. Technical measures shall be taken into account, where appropriate, in relation to: fish size, mesh size or gear, closed seasons, closed areas, areas reserved for particular (e.g. artisanal) fisheries, protection of juveniles or spawners.

Measures are in place in BSAI crab fisheries that restrict sizes that can be retained, require escape mechanisms to protect undersize and female crabs, establish closed seasons and closed areas and reserve areas for local, aboriginal fisheries.<sup>51</sup> The BSAI crab FMP authorizes the State to adjust size limits under State regulations. Typically, biological considerations are used to establish minimum legal size limits to ensure that conservation needs are served. Unless a surplus is determined to be available, female crabs cannot be taken. Fishing seasons are used to protect crabs during the molting and mating portions of their life cycle. Closed seasons have been set to maximize the reproductive potential of crab populations. The FMP specifically prohibits the use of trawls and tanglenet gear for catching crab because of the high mortality rates that could be inflicted on nonlegal crab. Pots and ring nets are the specified legal commercial gear in the BSAI crab fisheries. FMPs are required to describe and identify Essential Fish Habitat (EFH), minimize to the extent practicable adverse effects of fishing on EFH, and identify other actions to conserve and enhance EFH. The BSAI crab FMP describes crab EFH and includes information on habitat and biological requirements for each life history stage of these species.

8.6. Fishing gear shall be marked.

Gear used in BSAI crab fisheries has to be marked so the owner can be identified.

<sup>47</sup> [https://www.npfmc.org/wp-content/PDFdocuments/catch\\_shares/Crab/AppendixA-SocialImpactAssessment.pdf](https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/Crab/AppendixA-SocialImpactAssessment.pdf)

<sup>48</sup> [https://www.npfmc.org/wp-content/PDFdocuments/catch\\_shares/Crab/Crab10yrReview\\_Final2017.pdf](https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/Crab/Crab10yrReview_Final2017.pdf)

<sup>49</sup> <http://www.fakr.noaa.gov/ram>

<sup>50</sup> <http://www.cfec.state.ak.us>

<sup>51</sup> [http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/2017-2020\\_cf\\_king\\_tanner\\_crab.pdf](http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/2017-2020_cf_king_tanner_crab.pdf)



8.7. Measures shall be introduced to identify and protect depleted resources and those resources threatened with depletion, and to facilitate the sustained recovery/restoration of such stocks. Also, efforts shall be made to ensure that resources and habitats critical to the well-being of such resources which have been adversely affected by fishing or other human activities are restored.

Measures are in place to identify and protect depleted resources and those resources threatened with depletion, and to facilitate their sustained recovery/restoration. Also, measures are in place to ensure that resources and habitats critical to the well-being of BSAI crab resources which have been adversely affected by fishing or other human activities are restored. The MSA also requires that the FMP include accountability measures to prevent ACLs from being exceeded and to correct overages if they do occur. Clearly defined management measures, including harvest strategies and control rules, designed to maintain crab stocks at levels capable of producing maximum sustainable levels are included in the FMP. Measures require reducing fishing mortality if a stock is declining and closure of the directed fishery if depleted.

The National Environmental Policy Act (NEPA)<sup>52</sup> requires preparation of an Environmental Impact Statement (EIS) for any federal action that may significantly affect the quality of the human environment. NEPA is a comprehensive process to provide checks and balances against changes to the environment that may impact ecosystems and the natural processes, as well as the socio-economic sphere of fisheries. The EIS Database<sup>53</sup> provides detailed information about EISs concerning potential impacts of federal action on the resources and habitats of Alaska.

8.8/8.9/8.10/8.11/8.12/8.13. States shall encourage the development and implementation of technologies and operational methods that reduce waste and discards and reduce the loss of fishing gear. The implications of the introduction of new fishing gears, methods and operations shall be assessed and the effects of such introductions monitored. New developments shall be made available to all fishers and shall be disseminated and applied appropriately.

BSAI crab fisheries are required to use gear and technologies that research has demonstrated are environmentally safe, cost effective and sufficiently selective to minimize catch, waste and discards of non-target species as well as the use of gear and practices that increase survival rates of escaping fish and crab. Use of highly selective pots to minimize unwanted catch of target species as well as the bycatch of non-target species, along with development of handling practice to minimize mortality of discarded catch, have been key aspects of the management of BSAI crab fisheries for a long time. All aspects of gear performance and discard mortality have been extensively researched. On-board observers in all fisheries record discards and estimates of total discard mortality are included in total fishery removals. This has provided considerable incentive to minimize unwanted catch to the fullest extent possible. Their reports demonstrate catches are dominated by legal crab of the target species, with much smaller amounts of other species.<sup>54</sup>

Selective, environmentally safe and cost-effective fishing gear and techniques have been developed and applied in BSAI crab fisheries to minimize the loss of gear and the ghost fishing effects of lost or abandoned gear, pollution and waste. After rationalization of the BSAI crab fisheries, vessel numbers decreased which resulted in a slower paced fishery with decreased rates of lost fishing gear and allowing for longer soak times and more time for escapement of undersized and female crab. Crabbers are constructing pots with larger web on the panels to allow for female and juvenile crab to exit the pot before the gear is hauled back. Alaska Administrative Code 39.145 requires escape mechanisms related to ghost fishing for shellfish and bottom-fish pots.

<sup>52</sup> <https://www.epa.gov/nepa/national-environmental-policy-act-review-process>

<sup>53</sup> [https://cdxnodengn.epa.gov/cdx-enepa-ii/public/action/eis/search;jsessionid=0875ED9C2F29B516C92603E60A7D62EF?search=&\\_fsk=-1062329806#results](https://cdxnodengn.epa.gov/cdx-enepa-ii/public/action/eis/search;jsessionid=0875ED9C2F29B516C92603E60A7D62EF?search=&_fsk=-1062329806#results)

<sup>54</sup> <http://www.adfg.alaska.gov/FedAidPDFs/FDS14-49.pdf>

ADFG perform pot and vessel holding tank inspections prior to each fishing season. At-sea enforcement of all regulations is conducted by Alaska Wildlife Troopers (AWT) and ADFG on-board observer program collects information that can be used for enforcement. There is no evidence to indicate any use of devices to circumvent the intent of gear regulations. Information on new gear developments and any related regulatory requirements are readily available to harvesters through professional associations and the licensing system.

New fishing technologies (i.e. new fishing gear, methods and operations) are fully assessed prior to introduction in order to understand their potential for disturbance of BSAI crab habitats and ecosystems. Any commercial-scale introduction of a new fishing method would necessarily undergo extensive evaluation prior to implementation as well as needing to demonstrate compliance with regulatory requirements and being subject to ongoing monitoring. Interviews with fisher representatives, fisheries managers and scientists during the surveillance audit indicated that no new fishing technologies of relevance to BSAI crab fisheries have been developed since re-assessment.

8.14. Policies shall be developed for increasing stock populations and enhancing fishing opportunities through the use of artificial structures.

NA

#### 8.4.2. Fundamental Clause 9

Fishing operations shall be carried out by fishers with appropriate standards of competence in accordance with international standards and guidelines and regulations.

<b>Number of Supporting clauses</b>	<b>3</b>
<b>Supporting clauses applicable</b>	<b>3</b>
<b>Supporting clauses not applicable</b>	<b>0</b>
<b>Overall level of conformity</b>	<b>Full Conformity</b>
<b>Non Conformances</b>	<b>0</b>

#### Summarized evidence:

##### 9.1./9.2./9.3. Education and training programs.

Advanced education and training programs are readily available and required by fishers to enhance their skills and professional qualifications.<sup>55,56,57</sup> At the Federal level, NOAA has formulated a plan to implement the FAO CCRF across all US fisheries (NMFS 1997)<sup>58</sup>. The plan, recently updated (NMFS 2012)<sup>59</sup>, includes objectives for education, safety and training of fishers. All those engaged in BSAI crab fishing operations are provided information on the most important provisions of the FAO CCRF (1995), as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations, as part of required education and training. Records of all BSAI crab fishers are maintained as part of licence and permit programs which contain information on their service and qualifications, including certificates of competency.<sup>60,61</sup>

<sup>55</sup> <http://www.avtec.edu>

<sup>56</sup> <http://seagrant.uaf.edu/map/fishbiz/index.php>

<sup>57</sup> <http://amsea.org>

<sup>58</sup> <https://repository.library.noaa.gov/view/noaa/3063>

<sup>59</sup> [https://repository.library.noaa.gov/view/noaa/4057/noaa\\_4057\\_DS1.pdf?](https://repository.library.noaa.gov/view/noaa/4057/noaa_4057_DS1.pdf?)

<sup>60</sup> <http://www.fakr.noaa.gov/ram>

<sup>61</sup> <http://www.cfec.state.ak.us>

## 8.5. Section E. Implementation, Monitoring and Control

### 8.5.1. Fundamental Clause 10

An effective legal and administrative framework shall be established and compliance ensured through effective mechanisms for monitoring, surveillance, control and enforcement for all fishing activities within the jurisdiction.

<b>Number of Supporting clauses</b>	<b>6</b>
<b>Supporting clauses applicable</b>	<b>2</b>
<b>Supporting clauses not applicable</b>	<b>4</b>
<b>Overall level of conformity</b>	<b>Full Conformity</b>
<b>Non Conformances</b>	<b>0</b>

#### Summarized evidence:

10.1. Effective mechanisms shall be established for fisheries monitoring, surveillance, control and enforcement measures including, where appropriate, observer programs, inspection schemes and vessel monitoring systems, to ensure compliance with the conservation and management measures for the fishery in question. This could include relevant traditional, fisher or community approaches, provided their performance could be objectively verified.

There is a collaborative effort emphasizing the at-sea enforcement between the USCG and the AWT. Under joint management there are both state and federal laws to enforce, and both state and federal agents actively conduct at-sea enforcement. The USCG is responsible for enforcing the main federal vessel regulations: this includes safety at sea, drug enforcement, vessel compliance with ESA and EFH requirements and assuring compliance of federal permits, observer coverage, licenses and VMS in the crab fisheries. AWT have vessels that conduct at-sea compliance with gear regulations, capable of hauling and confiscating crab pots, sample crab harvests at sea, assure sex and size requirements are met and assure that the vessels have all required state and federal licenses. Additionally AWT, along with ADFG area biologists and technicians, conduct vessel inspections dockside, conducting hold inspections and observing offloads of harvested crab for compliance. The entire crab harvests are conducted in Alaskan waters by American vessels. No foreign fleet is allowed to fish in the Alaska's EEZ. Because the fishery was rationalized in 2005, most enforcement of IFQ/IPQ violations, as well as size, sex and season violations occur at offloading.

The NMFS Office of Law Enforcement with use of the United States Coast Guard's at-sea platforms is primarily responsible for enforcing crab regulations at sea, while the NMFS Office of Law Enforcement and the State of Alaska's Division of Wildlife Troopers (AWT) have that responsibility ashore. AWT spends about 90% of their effort doing dockside enforcement of offloaded crab (although The AWT vessel E/V Stinson also does at-sea enforcement, checking gear and catch for legal specification). The U.S. Coast Guard (USCG) and NMFS Office of Law Enforcement (OLE) enforce Alaska fisheries laws and regulations, especially 50 CFR 679.

In 2018, there were a total of 38 federal fisheries & safety boardings documented by the US Coast Guard: 9 boardings for vessels fishing BBRKC, 26 boardings for vessels fishing Tanner Crab and 3 boardings for vessels fishing AIGKC. A total of 3 notices of violation (NOVs) were issued, all to vessels fishing Tanner Crab and all in relation to expired visual distress signals.

10.2 Fishing vessels shall not be allowed to operate on the resource in question without specific authorization. All vessels harvesting BSAI crab must be authorized and permitted to fish, in accordance with federal regulations. Fishing vessels are not allowed to operate on the resource in question without specific authorization. All crab vessels participating in the BSAI rationalized crab fishery must obtain a Federal Crab Vessel Permit (FCVP).

An annual FCVP is required for owners of any vessel used in the rationalized crab fisheries (CR crab, includes IFQ/IPQ fisheries; CDQ fisheries except Norton Sound king crab; and the Golden King Crab allocation to Adak). Operation Type endorsements are: SFP (Stationary Floating Processor); CPR (catcher-processor); and CAT (catcher vessel). This permit has requirements for VMS and logbook reporting. A copy of the permit must be on board any vessel of the fishery and must be available for inspection at any time by an authorized officer.

As of January 1, 2000, a Federal LLP license is required for vessels participating in directed fishing for LLP groundfish species in the GOA or BSAI, or fishing in any BSAI LLP crab fisheries. A vessel must be named on an original LLP license that is onboard the vessel.

10.3 States involved in the fishery shall, in accordance with international law, within the framework of sub-regional or regional fisheries management organizations or arrangements, cooperate to establish systems for monitoring, control, surveillance and enforcement of applicable measures with respect to fishing operations and related activities in waters outside their national jurisdiction.

**Not Applicable.** The crab fisheries under assessment here are harvested exclusively within the Alaska EEZ only. Those fisheries are not part of any international agreement or part of a framework of sub-regional or regional fisheries management organizations or arrangements.

10.3.1 States which are members of or participants in sub-regional or regional fisheries management organizations or arrangements shall implement internationally agreed measures adopted in the framework of such organizations or arrangements and consistent with international law to deter the activities of vessels flying the flag of non-members or non-participants which engage in activities which undermine the effectiveness of conservation and management measures established by such organizations or arrangements. In that respect, Port States shall also proceed, as necessary, to assist other States in achieving the objectives of the FAO CCRF (1995), and should make known to other States details of regulations and measures they have established for this purpose without discrimination for any vessel of any other State

**Not Applicable.** The crab fisheries under assessment here are harvested exclusively within the Alaska EEZ only. Those fisheries are not part of any international agreement or part of a framework of sub-regional or regional fisheries management organizations or arrangements.

10.4 Flag States shall ensure that no fishing vessels entitled to fly their flag fish on the high seas or in waters under the jurisdiction of other States unless such vessels have been issued with a Certificate of Registry and have been authorized to fish by the competent authorities. Such vessels shall carry on board the Certificate of Registry and their authorization to fish.

**Not Applicable.** The entire crab harvests are conducted in Alaskan waters by American vessels. No foreign fleet is allowed to fish in the Alaska's EEZ. All fishing vessels must be at least 75% U.S. ownership.

10.4.1 Fishing vessels authorized to fish on the high seas or in waters under the jurisdiction of a State other than the flag State shall be marked in accordance with uniform and internationally recognizable vessel marking systems such as the FAO Standard Specifications and Guidelines for Marking and Identification of Fishing Vessels.

**Not Applicable.** The entire crab harvests are conducted in Alaskan waters by American vessels. No foreign fleet is allowed to fish in the Alaska's EEZ. All fishing vessels must be at least 75% U.S. ownership.

### 8.5.2. Fundamental Clause 11

There shall be a framework for sanctions for violations and illegal activities of adequate severity to support compliance and discourage violations.

<b>Number of Supporting clauses</b>	<b>3</b>
<b>Supporting clauses applicable</b>	<b>2</b>
<b>Supporting clauses not applicable</b>	<b>1</b>
<b>Overall level of conformity</b>	<b>Full Conformity</b>
<b>Non Conformances</b>	<b>0</b>

#### Summarized evidence:

11.1/11.2/11.3. Enforcement policies and regulations, state and federal:

#### 11.1 National laws of adequate severity shall be in place that provide for effective sanctions.

The Magnuson-Stevens Act (MSA) provides four basic enforcement remedies for violations (50 CFR 600.740 Enforcement policy)<sup>62</sup>:

1. Issuance of a citation (a type of warning), usually at the scene of the offense (see 15 CFR part 904, subpart E).
2. Assessment by the Administrator of a civil money penalty.
3. For certain violations, judicial forfeiture action against the vessel and its catch.
4. Criminal prosecution of the owner or operator for some offenses.

In some cases, the MSA requires permit sanctions following the assessment of a civil penalty or the imposition of a criminal fine. In sum, the MSA treats sanctions against the fishing vessel permit to be the carrying out of a purpose separate from that accomplished by civil and criminal penalties against the vessel or its owner or operator.

On March 16, 2011, NOAA issued a new Penalty Policy that provided guidance for the assessment of civil administrative penalties and permit sanctions under the statutes and regulations enforced by NOAA. In that Policy, the NOAA General Counsel's Office committed to periodic review of the Penalty Policy to consider revisions or modifications as appropriate. The July 2014 revised version of the Penalty Policy<sup>63</sup> is a result of that review. The purpose of the 2014 Policy is to ensure that;

1. Civil administrative penalties and permit sanctions are assessed in accordance with the laws that NOAA enforces in a fair and consistent manner;
2. Penalties and permit sanctions are appropriate for the gravity of the violation;
3. Penalties and permit sanctions are sufficient to deter both individual violators and the regulated community as a whole from committing violations;
4. Economic incentives for noncompliance are eliminated; and
5. Compliance is expeditiously achieved and maintained to protect natural resources.

Under the new revised Policy, NOAA expects to continue to promote consistency at a national level, provide greater predictability for the regulated community and the public, maintain transparency in enforcement, and more effectively protect natural resources.

<sup>62</sup> <https://www.law.cornell.edu/cfr/text/50/600.740>

<sup>63</sup> <https://www.gc.noaa.gov/enforce-office3.html>

For significant violations, the NOAA attorney may recommend charges under NOAA's civil administrative process (see 15 CFR Part 904), through issuance of a Notice of Violation and Assessment of a penalty (NOVA), Notice of Permit Sanction (NOPS), Notice of Intent to Deny Permit (NIDP), or some combination thereof. Alternatively, the NOAA attorney may recommend that there is a violation of a criminal provision that is sufficiently significant to warrant referral to a U.S. Attorney's office for criminal prosecution.

11.2 Sanctions applicable in respect of violations and illegal activities shall be adequate in severity to be effective in securing compliance and discouraging violations wherever they occur. Sanctions shall also be in force that affects authorization to fish and/or to serve as masters or officers of a fishing vessel, in the event of non-compliance with conservation and management measures.

The MSA provides four basic enforcement remedies for violations (50 CFR 600.740 Enforcement policy):

1. Issuance of a citation, usually at the scene of the offense (see 15 CFR part 904, subpart E).
2. Assessment by the Administrator of a civil money penalty.
3. For certain violations, judicial forfeiture action against the vessel and its catch.
4. Criminal prosecution of the owner or operator for some offenses.

In some cases, the MSA requires permit sanctions following the assessment of a civil penalty or the imposition of a criminal fine. In summary, the MSA treats sanctions against the fishing vessel permit to be the carrying out of a purpose separate from that accomplished by civil and criminal penalties against the vessel or its owner or operator.

NOAA's OLE Agents and Officers can assess civil penalties directly to the violator in the form of Summary Settlements (SS) or can refer the case to NOAA's Office of General Counsel for Enforcement and Litigation (GCEL). GCEL can then assess a civil penalty in the form of a Notice of Permit Sanctions (NOPS) or Notice of Violation and Assessment (NOVAs), or they can refer the case to the U.S. Attorney's Office for criminal proceedings. For perpetual violators or those whose actions have severe impacts upon the resource criminal charges may range from severe monetary fines, boat seizures and/or imprisonment may be levied by the United States Attorney's Office.

There are very few repeat offenders. Sanctions include the possibility of temporary or permanent revocation of fishing privileges. Withdrawal or suspensions of authorizations to serve as masters or officers of a fishing vessel are also among the enforcement options. Within the USA EEZ, penalties can range up through forfeiture of the catch to forfeiture of the vessel, including financial penalties and prison sentences.

Finally, the cooperation of citizens and industry is cultivated through programs such as AWT's Fish & Wildlife Safeguard program, which encourages the reporting of violations, and "leverages" the range of enforcers.

11.3 Flag States shall take enforcement measures in respect of fishing vessels entitled to fly their flag which have been found by them to have contravened applicable conservation and management measures, including, where appropriate, making the contravention of such measures an offence under national legislation.

**Not applicable.** The entire crab harvests are conducted in Alaskan waters by American vessels. No foreign fleet is allowed to fish in the Alaska's EEZ. All fishing vessels must be at least 75% U.S. ownership.

## 8.6. Section F. Serious Impacts of the Fishery on the Ecosystem

### 8.6.1. Fundamental Clause 12

Considerations of fishery interactions and effects on the ecosystem shall be based on best available science, local knowledge where it can be objectively verified and using a risk based management approach for determining most probable adverse impacts. Adverse impacts on the fishery on the ecosystem shall be appropriately assessed and effectively addressed.

<b>Number of Supporting clauses</b>	<b>16</b>
<b>Supporting clauses applicable</b>	<b>16</b>
<b>Supporting clauses not applicable</b>	<b>0</b>
<b>Overall level of conformity</b>	<b>Medium Conformity</b>
<b>Non Conformances</b>	<b>1 Open NC (no new NCs)</b>

#### Summarized evidence:

##### 12.1. Assessment of environmental effects on target stocks and ecosystem

There is an assessment of the impacts of environmental factors on target stocks and species belonging to the same ecosystem. NPFMC and NMFS regularly assess the impacts of environmental factors on BSAI crab stocks (e.g. Crab SAFE; NPFMC 2018)<sup>64</sup> and other species belonging to the same ecosystem (e.g. Groundfish SAFE).<sup>65</sup> Ecosystem assessments for BSAI crab fisheries are updated annually in the BSAI Crab SAFE. Additionally, the status of habitats and ecosystems are monitored within the broader framework of Alaska's ecosystems and the results are updated and published annually.<sup>66</sup> Collectively, these ecosystem assessments consider target stocks, associated or dependent species, and the relationship among populations in the ecosystem.

In 2018, the Council approved the Bering Sea Fisheries Ecosystem Plan (NPFMC 2018)<sup>67</sup>, thereby formalizing its commitment to ecosystem-based fisheries management (EBFM) of the Bering Sea. The Council has acknowledged that moving toward EBFM is an ongoing process and as new information or tools become available the Council will respond by improving the fishery management program. The BS FEP will serve as a framework for continued incorporation of ecosystem goals and actions in regional management. The BS FEP sits alongside the Fishery Ecosystem Plan already developed for the Aleutian Islands (NPFMC 2007)<sup>68</sup> and it augments ongoing efforts for monitoring ecosystems in the Alaska Region.<sup>69</sup> Additional ongoing and related ecosystem research and monitoring initiatives are described in greater detail in the BSAI Crab Re-assessment Report<sup>70</sup>.

##### 12.2 Research and Institutional capacity for environmental impact assessment

Adverse environmental impacts on BSAI crab resources from human activities are assessed. NPFMC and NMFS conduct regular assessments of crab ecosystems and habitats and investigate how environmental factors affect crab resources (e.g. Chilton et al. 2011). Findings and conclusions are published in the Ecosystem section of the annual SAFE document (e.g. NPFMC 2018)<sup>71</sup>, annual Ecosystem Status Reports<sup>72</sup>, and scientific journals.<sup>73,74,75</sup>

<sup>64</sup> <https://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports/>

<sup>65</sup> <https://www.afsc.noaa.gov/REFM/stocks/assessments.htm>

<sup>66</sup> [https://www.afsc.noaa.gov/refm/stocks/plan\\_team/2018/NovDraftDocs\\_2018.htm](https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/NovDraftDocs_2018.htm)

<sup>67</sup> <http://meetings.npfmc.org/CommentReview/DownloadFile?p=9fd5d027-86a8-4983-a7e7-f456acc478bf.pdf&fileName=C4%20BS%20FEP.pdf>

<sup>68</sup> <https://www.npfmc.org/aleutian-islands-fishery-ecosystem-plan/>

<sup>69</sup> [https://www.afsc.noaa.gov/refm/stocks/plan\\_team/2018/NovDraftDocs\\_2018.htm](https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/NovDraftDocs_2018.htm)

<sup>70</sup> <https://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-crab/>

<sup>71</sup> <https://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports/>

<sup>72</sup> [https://www.afsc.noaa.gov/refm/stocks/plan\\_team/2018/NovDraftDocs\\_2018.htm](https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/NovDraftDocs_2018.htm)

<sup>73</sup> <https://academic.oup.com/icesjms/article/73/3/849/2458912>

<sup>74</sup> <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0060959>

<sup>75</sup> <https://doi.org/10.1371/journal.pone.0178955>



Currently, the best available science indicates that the largest impact resulting from human activities on BSAI crab resources, and more specifically, on the five stocks under consideration here, is fishing. Directed crab fishing as well as crab bycatch in other fisheries such as the groundfish fisheries is assessed yearly and accounted for appropriately through yearly stock assessment activities, and through the formulation of overfishing levels (OFLs), acceptable biological catches (ABCs), annual catch limits (ACLs), and total allowable catches (TACs). These determinations and actions are all documented in the yearly crab SAFE report compiled by ADFG, NMFS and NPFMC scientists

NMFS examines the effects of non-fishing activities on EFH (Limpinsel et al. 2017)<sup>76</sup> and makes conservation recommendations designed to mitigate a range of activities that may have adverse impacts on EFH including: oil and gas exploration and development; vessel casualties that result in physical damage to living habitats or spill of toxic substances (i.e., oil spill); introduction of exotic species; depositional fill; marine dredging; mineral extraction; and waste water discharges. These conservation recommendations are included in the FMPs, and they have been reviewed by the staff of NMFS Alaska Region HCD. These recommendations are used by NMFS staff when consulting on effects to EFH by other agencies, and updating the FMPs to reflect the most recent recommendations may be a higher priority amendment for the Council to consider (Simpson et al. 2017).<sup>77</sup>

Where the potential for adverse environmental impacts on crab resources does arise, there is evidence that the Council considers and undertakes appropriate corrective measures. For example, effects on crab EFH caused by fishing activities such as trawling are routinely assessed (see NOAA's recent EFH 5-year review summary report; Simpson et al. 2017). In addition, there is strong evidence that the Council and NMFS take measures to protect and conserve EFH and HAPCs through establishment of habitat protection areas and habitat conservation areas.

More broadly, NEPA processes ensure that human activities with potential to impact BSAI crab resources are assessed and, where appropriate, corrected. The Council's analytical review documents that evaluate proposed changes to the conservation and management of groundfish and shellfish stocks for which they are responsible, are NEPA compliant documents. These documents are widely distributed and made available so that the public at large and other natural resource, management or development agencies will have an opportunity to testify or comment on possible impacts to their sphere of influence. In like manner, when other resource, development or management agencies that receive federal funds wish to implement new activities or develop new regulations that may impact fisheries under the auspices of the Council, they must also develop NEPA documents which show their project's plan conform to existing Council FMPs and seek comments from the Council on ways that their proposed activities may impact the resources under Council jurisdiction.

As discussed under clause 2.1, NEPA requires federal agencies to prepare Environmental Assessments or Environmental Impact Statements prior to making decisions. The President's Council on Environmental Quality, referred to as CEQ, which was established along with NEPA, has adopted regulations and other guidance that provide general procedures for federal agencies to follow when preparing these documents. Moreover, each federal agency has adopted its own detailed NEPA procedures, and the federal courts, after more than 30 years of litigation, have played a major role in shaping NEPA's interpretation and implementation. Further details of the process can be found in *The NEPA Book* (Bass et al. 2001)<sup>78</sup> and *A Citizen's Guide to NEPA* (CEQ 2007).<sup>79</sup>

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<sup>76</sup> [ftp://ftp.library.noaa.gov/noaa\\_documents.lib/NMFS/TM\\_NMFS\\_AFKR/TM\\_NMFS\\_FAKR\\_14.pdf](ftp://ftp.library.noaa.gov/noaa_documents.lib/NMFS/TM_NMFS_AFKR/TM_NMFS_FAKR_14.pdf)

<sup>77</sup> <https://alaskafisheries.noaa.gov/habitat/efh>

<sup>78</sup> [http://www.solano.com/old\\_site\\_02/oldsite/bookinfo\\_nepa.htm](http://www.solano.com/old_site_02/oldsite/bookinfo_nepa.htm)

<sup>79</sup> [https://ceq.doe.gov/get-involved/citizens\\_guide\\_to\\_nepa.html](https://ceq.doe.gov/get-involved/citizens_guide_to_nepa.html)

### 12.3./12.4/12.5/12.6. Fishery Interaction with the ecosystem, non-target catches, discards associated, dependent or endangered species

The management system considers the most probable adverse impacts of BSAI crab fisheries on the ecosystem/environment, taking into account available scientific information and local knowledge. Where the risk of adverse impact of crab fisheries on the ecosystem or environment is greater, the Council seeks more specific evidence to support management action by, for example, identifying research priorities and coordinating research plans. Chilton et al. (2011)<sup>80</sup> provide a good summary of available scientific information on the most probable adverse impacts of BSAI crab fisheries on the ecosystem/environment.

The fishery management system addresses impacts that are likely to have serious consequences. NPFMC and NMFS conduct regular assessments of crab ecosystems and habitats and investigate how environmental factors affect crab resources. Findings and conclusions are published in the Ecosystem section of the annual SAFE document, annual Ecosystem Status Reports, and scientific journals (see rationale for supporting clause 12.2).

Decisions regarding management responses always proceed from the best available scientific information. Management responses may be immediate (e.g. a Category 2 response taken by the State such as in-season adjustments) or they may be more protracted, following on further analysis of the identified risk (e.g. a Category 1 response such as a decision taken by the Council and NMFS to amend the Crab FMP).

Appropriate measures are applied to minimize the catch, waste and discards of non-target species (of both fish and non-fish species), and to minimize impacts on associated, dependent or endangered species. The BSAI crab fisheries under consideration here have relatively low levels of catch of non-target species and are therefore often described as “clean” fisheries (C. Siddon, Marine Fisheries Scientist, ADFG Division of Commercial Fisheries, pers. comm.). The majority of non-target species taken in each of the five fisheries are mostly crab. A limited number of groundfish, such as Pacific cod, Pacific halibut, yellowfin sole, and sculpin (*Myoxocephalus* spp.), are caught in the directed pot fishery (Barnard and Burt 2008; Gaeuman 2014).<sup>81,82</sup> The invertebrate component of bycatch includes echinoderms (sea stars and sea urchins), snails, non-FMP crab (hermit crabs and lyre crabs), and other invertebrates (sponges, octopus, anemone, and jellyfish). Typically, low levels of bycatch of these species do not impact their abundance (Final EIS, NMFS 2004).<sup>83</sup> Appropriate conservation and management measures are applied to BSAI crab fisheries to minimize levels of catch, waste and discards of non-target species (crab, fish and non-fish species). Gear modifications are described in the Crab FMP (NPFMC 2011).

ADFG has in place a mandatory observer program for BSAI crab fisheries (see Gaeuman 2014). Non-target catches, including discards, of stocks other than the “stock under consideration” are monitored. ADFG publishes an annual summary of the mandatory crab observer program database for the Bering Sea/Aleutian Islands commercial crab fisheries. During surveillance it was noted that ADFG will discontinue its publication of annual summaries but ADFG will continue to maintain the observer database and provide relevant information to stock assessment authors (M. Stichert, pers. comm.) Representative bycatch data from the ADFG summary reports were presented in the BSAI Crab Re-assessment Report.<sup>84</sup>

<sup>80</sup> [http://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/CrabSAFE/511Chapters/Ecosystem\\_CrabSAFE.pdf](http://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/CrabSAFE/511Chapters/Ecosystem_CrabSAFE.pdf)

<sup>81</sup> <http://www.adfg.alaska.gov/FedAidPDFs/fds08-17.pdf>

<sup>82</sup> <http://www.adfg.alaska.gov/FedAidPDFs/FDS14-49.pdf>

<sup>83</sup> <https://alaskafisheries.noaa.gov/sites/default/files/analyses/crabeis0804-chapters.pdf>

<sup>84</sup> <https://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-crab/>

Management objectives exist which seek to ensure that endangered species are protected from adverse impacts resulting from interactions with BSAI crab fisheries. All U.S. fisheries management, including that of BSAI crab fisheries, must be consistent with the Magnuson-Stevens Act (MSA), the Marine Mammal Protection Act (MMPA)<sup>85</sup>, and the U.S. Endangered Species Act (ESA).<sup>86</sup> Each of these acts establishes management guidelines, objectives and legal protections for threatened and endangered species.

#### 12.7. Role of the “stock under consideration” in the ecosystem

The role of BSAI crab stocks in the food web is adequately considered. King and Tanner Crab stocks under assessment are not considered key prey species in BSAI ecosystems.

#### 12.8. Pollution – MARPOL.

Laws and regulations based on the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) are in place and enforced.<sup>87, 88</sup>

#### 12.9. Knowledge of the essential habitats for the “stock under consideration” and potential fishery impacts on them.

In accordance with requirements of the MSA, management agencies have knowledge of essential fish habitat (EFH) for the BSAI crab stocks under consideration. The potential for fishery impacts on EFH is assessed. Management systems ensure that fishery impacts on EFH and on habitats that are highly vulnerable to damage by the fishing gear are avoided, minimized or mitigated. In assessing fishery impacts, the full spatial range of the relevant habitat is considered.

Essential Fish Habitat (EFH) is defined in the Magnuson-Stevens Fishery Conservation and Management Act (MSA) as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat: “waters” includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; “substrate” includes sediment, hard bottom structures underlying the waters, and associated biological communities; “necessary” means the habitat required to support a sustainable fishery and a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers a species’ full life cycle (see Crab FMP; NPFMC 2011). The MSA requires fishery management plans to describe and identify EFH, minimize to the extent practicable adverse effects of fishing on EFH, and identify other actions to conserve and enhance EFH (16 U.S.C. 1853(a)(7)). The NPFMC and NMFS identify and describe crab EFH in section Appendix D.3 of the Fishery Management Plan for BSAI king and Tanner Crab (NPFMC 2011).

NPFMC initiated a review of EFH in 2015 and found there had been large advances in EFH information, and in particular there had been a substantial refinement of EFH maps for fish and crab species (Simpson et al. 2017). Refinements were obtained through an analysis to determine the environmental influences on species distributions and this information was used to improve EFH maps. These maps provide EFH Level 2 information (habitat-related densities) for the adult life stage for many FMP species and EFH Level 1 information (habitat distribution) for the juvenile life stages of some FMP species. These maps also provide a solid foundation for the next 5 years of EFH research. According to the most recent NPFMC review of EFH, during 2006-2016 NMFS had spent about \$5 M in total on 91 EFH projects in Alaska resulting in 74 scientific publications (NPFMC 2016).

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<sup>85</sup> <http://www.nmfs.noaa.gov/pr/laws/mmpa/>

<sup>86</sup> <https://www.fws.gov/endangered/laws-policies/>

<sup>87</sup> <https://www.blankrome.com/publications/marpol-enforcement-united-states>

<sup>88</sup> <https://www.epa.gov/enforcement/act-prevent-pollution-ships-apps-enforcement-case-resolutions>

In 2018, NFMS published the Final Environmental Assessment for Essential Fish Habit Omnibus Amendments<sup>89</sup> which included Amendment 49 to the Fishery Management Plan for Bering Sea/Aleutian Islands King and Tanner Crabs. Amendment 49 set forth recommendations to revise EFH descriptions for individual species as follows: editorial revisions to descriptions of habitat types, general life history, and habitat descriptions for all crab species; updates to relevant trophic information; recommend use of updated maps to describe EFH; updates to habitat and biological associations; updates to habitat and diet tables; editorial revisions to fishery descriptions; updates to EFH description for Red King Crab early juveniles; updates to EFH description for Blue King Crab early juveniles; recommend Level 1 for early juvenile Red King Crab and Blue King Crab (other life stages remain unchanged); updates to habitat association table; and updates to predator/prey associations table.

NFMS has also released a five-year plan for EFH research (Sigler et al. 2017).<sup>90</sup> The new EFH research plan retains the original long-term goals that have guided EFH research in Alaska since 2005, namely: 1) characterize habitat utilization and productivity; 2) assess habitat sensitivity and recovery; 3) validate and improve fishing impacts model; 4) map the seafloor; and 5) assess coastal habitats facing development. However, the 2017 EFH plan recognizes two specific objectives that are to be achieved over the next five years: 1) Develop EFH Level 1 information (distribution) for life stages and areas where missing; and 2) Raise EFH level from Level 1 or 2 (habitat-related densities) to Level 3 (habitat-related growth, reproduction, or survival rates). In addition, a recent report by the Alaska Regional Habitat Assessment Prioritization Team (McConnaughey et al. 2017)<sup>91</sup> assigned prioritization scores to the five crab stocks under consideration here that were either ‘high’ (AI Golden King Crab, BB Red King Crab, SM Blue King Crab and EBS snow crab) or ‘medium’ (EBS Tanner crab).

12.10. Research shall be promoted on the environmental and social impacts of fishing gear and, in particular, on the impact of such gear on biodiversity and coastal fishing communities.

Management agencies actively promote research on the environmental and social impacts of fishing gear and, in particular, on the impact of such gear on biodiversity and coastal fishing communities. The Council, AFSC and the NPRB all annually produce a list of research priorities<sup>92,93, 94</sup> that focus on timely and important management concerns. This list helps NMFS, NPRB and other research funding agencies focus their tight research funds to resolve topical fishery management issues. For BSAI crab fisheries, the Council has established an explicit “Research and Management Objective” in the crab FMP (NPFMC 2011) to provide fisheries research, data collection, and analysis to ensure a sound information base for management decisions. Other organizations are also actively involved in relevant research on the environmental impacts of fishing gear on biodiversity, habitats and ecosystems as previously described under clauses 2.5 and 2.6.

12.11. Outcome indicator(s) and management objectives for non-target stocks.

There are outcome indicators for non-target stocks taken in the BSAI crab fisheries under assessment. These outcome indicators are consistent with achieving management objectives for non-target stocks (i.e. avoiding overfishing and other impacts that are likely to be irreversible or very slowly reversible).

*Crab Bycatch (crab FMP species)*

The largest component of bycatch in BSAI crab fisheries is crab (undersized, female, and non-target species). For those crab species falling within the scope of the BSAI king and Tanner Crab FMP (Red King Crab, *Paralithodes*

<sup>89</sup> <https://alaskafisheries.noaa.gov/sites/default/files/analyses/efh-omnibus-amendments-ea0618.pdf>

<sup>90</sup> <http://www.afsc.noaa.gov/Publications/ProcRpt/PR2017-05.pdf>

<sup>91</sup> <https://repository.library.noaa.gov/view/noaa/15500>

<sup>92</sup> <https://www.npfmc.org/research-priorities/>

<sup>93</sup> [https://www.afsc.noaa.gov/program\\_reviews/2017/2017\\_Core\\_Documents/FY18%20AFSC%20AGM.pdf](https://www.afsc.noaa.gov/program_reviews/2017/2017_Core_Documents/FY18%20AFSC%20AGM.pdf)

<sup>94</sup> <https://www.nprb.org/nprb>

*camtschaticus*, Blue King Crab, *P. platypus*, golden (or brown) king crab, *Lithodes aequispinus*, Tanner crab, *Chionoecetes bairdi*, and snow crab, *C. opilio*, in the BS/AI area, except for the following stocks exclusively managed by the State of Alaska: Aleutian Islands Tanner crab, Dutch Harbor Red King Crab, St. Matthew golden king crab, and St. Lawrence Blue King Crab.; NPFMSC 201188), outcome indicators are explicitly incorporated into the Council's five-tiered system for stock assessment. Non-target crab bycatch of FMP species in directed crab fisheries, as well as FMP crab bycatch in other fisheries (such as the groundfish fisheries) is assessed yearly and corrected appropriately through yearly stock assessment activities, and through the formulation of overfishing levels (OFLs), acceptable biological catches (ABCs), annual catch limits (ACLs), and total allowable catches (TACs). These determinations and actions are all documented in the yearly crab SAFE report compiled by ADFG, NMFS and NPFMC scientists (e.g. Crab SAFE, NPFMC 2018)<sup>95</sup>. Annual trawl surveys (Lang et al. 2018)<sup>96</sup> collect fishery-independent data on the distribution and abundance of crab, groundfish, and other benthic resources in the eastern Bering Sea. These data are used to estimate population abundances for the management of commercially important species in the region.

#### *Finfish Bycatch*

The ADFG observer program collects data to monitor bycatch in BSAI crab fisheries. Fish including a number of crab predators, especially Pacific cod, halibut, yellowfin sole and sculpin account for the greatest proportion of estimated crab pot bycatch (Final EIS, NMFS 2004).<sup>97</sup> These species are widely distributed and highly abundant representatives of the greater groundfish community. Pacific cod is managed by NPFMC as a tier 3 stock in the Eastern Bering Sea (Thompson 2017)<sup>98</sup>, yellowfin sole is managed as a tier 1 stock in BSAI (Wilderbuer et al. 2017)<sup>99</sup>, and BSAI sculpin are managed by NPFMC as a species complex within tier 5 (Spies et al. 2016).<sup>100</sup> As such, there are outcome indicators whose explicit aim is to avoid overfishing. Similarly, outcome indicators (reference points) exist for Pacific halibut, a species managed by the International Pacific Halibut Commission (IPHC). Halibut fisheries are closely monitored, heavily regulated, and the resource is currently considered to be healthy (i.e. female spawning biomass is well above the IPHC limit reference point for the stock; IPHC 2018).<sup>101</sup>

In the Final Environmental Impact Statement for BSAI crab fisheries, it was concluded that the effects on species caught as bycatch in the BSAI crab fisheries are insignificant (NMFS 2004). During the surveillance audit, stock assessment authors and fishery managers confirmed that there had been no noteworthy changes in the quantity or composition of bycatch in the crab fisheries under consideration since re-assessment (B. Stockhausen, C. Szuwalski, M. Stichert, pers. comm.).

#### *Invertebrate Bycatch (excluding crab FMP species)*

Data on invertebrate bycatch are also collected in the ADFG observer program. These data were reviewed by NFMS during preparation of the Final Environmental impact Statement for BSAI crab fisheries (NMFS 2004). The following excerpt from the Final EIS discusses invertebrate bycatch: Crab pot bycatch is deemed insignificant for any population of other benthic species routinely caught in the major eastern Bering Sea crab fisheries. Fishes including Pacific cod, yellowfin sole, Pacific halibut, sculpin, walleye pollock, other flatfish, and skates all have very high abundance relative to the level of estimated pot bycatch. Gastropods and echinoderms comprise a major portion of the total biomass of the eastern Bering Sea and small losses due to pot bycatch would have little significance. In some cases crab pot bycatch have become part of small dedicated fisheries as for snails, octopus,

<sup>95</sup> <https://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports/>

<sup>96</sup> <https://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-372.pdf>

<sup>97</sup> <https://alaskafisheries.noaa.gov/sites/default/files/analyses/crabeis0804-chapters.pdf>

<sup>98</sup> <https://www.afsc.noaa.gov/REFM/Docs/2017/EBSpcod.pdf>

<sup>99</sup> <https://www.afsc.noaa.gov/REFM/Docs/2017/BSAIyfin.pdf>

<sup>100</sup> <https://www.afsc.noaa.gov/REFM/Docs/2017/BSAIsculpin.pdf>

<sup>101</sup> <https://iphc.int/uploads/pdf/am/2018am/iphc-2018-am094-r.pdf>

and Korean hair crab. Minor losses of other invertebrates are not estimable but assumed to be relatively insignificant. In addition, the minor amount of these species caught as bycatch does not result in declines in species diversity because it does not cause a decline in any species abundance. From this information, NOAA Fisheries concludes that status quo has an insignificant effect on the population levels of benthic species caught as bycatch.

### *Seabirds*

NOAA's National Marine Fisheries Service (NOAA Fisheries) annually updates their estimates of seabirds caught as bycatch in commercial groundfish fisheries operating in Federal waters off Alaska (Eich et al. 2016, 2017, 2018). The most recent catch accounting data from 2007 through 2015 attribute 88% of seabird bycatch in the groundfish and halibut fisheries (hook-and-line, trawl, and pot gear, combined) to hook-and-line fisheries, 10% to trawl fisheries, and 2% to pot fisheries. NMFS (2004) indicated that the bycatch of non-ESA listed seabirds in groundfish and crab pot fisheries is approximately 100 birds per year consisting of primarily northern fulmars. NMFS (2004) concluded that fisheries on crab FMP species have very limited interactions with seabirds and that the interactions that do occur do not impact any species of seabird on a population level (see supporting clause 12.12 for further discussion about the potential for crab fisheries to interact with ESA-listed seabird species).

### 12.12. Outcome indicator(s) and management objectives for endangered species.

There are outcome indicators consistent with ensuring that endangered species are protected from adverse impacts resulting from interactions with BSAI crab fisheries (including recruitment overfishing or other impacts) that are likely to be irreversible or very slowly reversible. Ongoing programs that monitor outcome indicators help to ensure that adverse impacts to endangered species do not arise.

The Marine Mammal Protection Act requires stock assessment reports to be reviewed annually for stocks designated as strategic, annually for stocks where there is significant new information available, and at least once every three years for all other stocks. Each stock assessment includes, when available, a description of the stock's geographic range, a minimum population estimate, current population trends, current and maximum net productivity rates, optimum sustainable population levels and allowable removal levels, and estimates of annual human-caused mortality and serious injury through interactions with commercial fisheries and subsistence hunters (see Muto et al. 2018 for the most recent Marine Mammal stock assessment for the Alaska region).<sup>102</sup>

The annual Ecosystems Status Reports<sup>103</sup> for the Aleutian Islands (Zador and Ortiz 2018) and Eastern Bering Sea (Siddon and Zador 2018) elaborate on additional outcome indicators which are consistent with monitoring for adverse impacts upon endangered species. For marine mammals, ecosystem indicators include estimations of stock abundance and/or related parameters for Stellar sea lions, northern fur seals, harbor seals, arctic ice seals (bearded seal, ribbon seal, ringed seal, spotted seal) and bowhead whales. For seabirds, The Alaska Maritime National Wildlife Refuge has monitored seabirds at colonies around Alaska in most years since the early- to mid-1970's. In the Eastern Bering Sea, time series of annual breeding success and phenology (among other parameters) are available for common murre, *Uria aalge*; thick-billed murre, *U. lomvia*; blacklegged kittiwake, *Rissa tridactyla*; red-legged kittiwake, *R. brevirostris*; and red-faced cormorants, *Phalacrocorax urile*, breeding on the Pribilof Islands (St. Paul and St. George Islands).

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<sup>102</sup> <https://repository.library.noaa.gov/view/noaa/18114>

<sup>103</sup> [https://www.afsc.noaa.gov/refm/stocks/plan\\_team/2018/NovDraftDocs\\_2018.htm](https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/NovDraftDocs_2018.htm)

In 2018, an ongoing seabird mortality event was reported as a noteworthy topic in the 2018 Ecosystem Status Report for the Eastern Bering Sea. Unlike mortality observed in the previous year, the 2018 seabird mortality event was concentrated in the Beringia Region. During USFWS seabird surveys from the northern GOA to the Beaufort Sea, 25 dead seabirds were encountered. This is less than the 70 dead birds encountered during 2017 surveys, but still much higher than the typical 2 birds per year. The 2018 seabird mortality event has been reported over a wide geographic region and throughout summer, with emaciation and starvation as the only identified cause of death. In addition, observations at seabird breeding colonies indicate lack of breeding attempts or very late and unsuccessful breeding. Together, these observations suggest that the seabird die-offs stem from a lack of food or unfavorable foraging conditions, indicating ecosystem changes that may be associated with abnormally high ocean water temperatures, particularly in the Pacific Arctic.

As noted in the Crab Ecosystem SAFE Report (Chilton et al. 2011)<sup>104</sup>, there is very limited potential for BSAI crab fisheries to have adverse impacts on endangered species or marine mammals. The USFWS website<sup>105</sup> identifies three seabird species that are listed as endangered or threatened in Alaska: Steller's eider, *Polysticta stelleri* (threatened); Spectacled eider, *Somateria fischeri* (threatened); and Short-tailed albatross, *Phoebastria albatrus* (endangered). In the Final EIS for BSAI crab NMFS 2004, NOAA Fisheries concluded that the actions considered in the Biological Assessment are not likely to (1) adversely affect the listed seabirds, or (2) destroy or adversely modify designated critical habitat. Results from ongoing monitoring of seabirds (Eich 2016) continue to support the conclusion that there is little if any bycatch of these species in BSAI crab fisheries

12.13. Outcome indicator(s) and management objectives for avoiding, minimizing or mitigating the impacts of the unit of certification on essential habitats for the "stock under consideration" and on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification.

The management system has well-established outcome indicators for avoiding, minimizing or mitigating impacts to essential fish habitat (EFH) for four of the assessed stocks. BB Red King Crab, SM Blue King Crab, EBS snow crab, and EBS Tanner Crab fisheries are not typically prosecuted in areas with habitats that are highly vulnerable to damage by pots. Outcome indicators for these units of assessment are consistent with achieving management objectives. A more detailed description of the evidence which supports this conclusion can be found in the BSAI Crab Re-Assessment Report<sup>106</sup>. Evidence reviewed by the team during the second surveillance assessment reaffirms the previous conclusion in this respect. New or updated information sources of relevance include recent scientific publications such as Goddard et al. (2017)<sup>107</sup>, MacLean et al. (2017)<sup>108</sup> and Rooper et al. (2018)<sup>109</sup> as well as a discussion paper on the effects of EFH in Alaska (NPFMC 2017)<sup>110</sup> and a Technical Memorandum summarizing the research completed under the Alaska Deep-Sea Coral and Sponge Initiative (Rooper et al. 2017)<sup>111</sup>.

As described in the BSAI Crab Re-assessment Report, the Aleutian Islands Golden King Crab fishery takes place in deep water areas where coral and sponge habitats may be adversely impacted by bottom contact gear such as pots. For the AI GKC unit of certification, it was not shown that outcome indicators are in place that are consistent with avoiding, minimizing, or mitigating the impact on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification (i.e. pots). For example, there are no spatial analyses available which would allow an estimation of current and historic overlap of AIGKC pot fishing effort with the distribution of vulnerable coral

<sup>104</sup> [http://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/CrabSAFE/511Chapters/Ecosystem\\_CrabSAFE.pdf](http://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/CrabSAFE/511Chapters/Ecosystem_CrabSAFE.pdf)

<sup>105</sup> <https://www.fws.gov/alaska/fisheries/endangered/listing.htm>

<sup>106</sup> <https://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-crab/>

<sup>107</sup> <https://deepsacoraldata.noaa.gov/library/results-of-the-2012-and-2014-underwater-camera-surveys-of-the-aleutian-islands>

<sup>108</sup> <https://www.frontiersin.org/articles/10.3389/fmars.2017.00142/full>

<sup>109</sup> <https://doi.org/10.1093/icesjms/fsx087>

<sup>110</sup> <https://alaskafisheries.noaa.gov/habitat/efh>

<sup>111</sup> <https://www.fisheries.noaa.gov/alaska/habitat-conservation/deep-sea-corals-and-sponge-research-alaska>

and sponge habitats in the Aleutian Islands. The AIGKC unit of certification was therefore assigned a medium confidence rating for clause 12.13 and, consequently, a minor non-conformity was raised at re-assessment (SAI Global 2017).

The minor non-conformance is now being addressed through a Corrective Action Plan that was developed by the Bering Sea Crab Client Group (BSCCG) and which was accepted by the assessment team and incorporated into the re-assessment report. According to the action plan, BSCCG will perform,

1. A complete historical spatial review of fishing effort as depicted in Figures 1 and 2 of this document which will include analysis of fishing effort in relation to the distribution of sensitive coral and sponge habitat using the best available information.
2. An update of the recent season's fishing effort in proximity to the coral closure areas.
3. A review of AIGKC observer pot bycatch data for coral species to evaluate trends in bycatch CPUE.

On January 29, 2019, the assessment team received an update to the corrective action plan to address Minor Non-Conformance #2 (Clause 12.13) with respect to indicators for monitoring the potential impact of the AI Golden King Crab unit of certification on sensitive or vulnerable habitats.

The client's corrective action plan (CAP) has three parts:

- 1) Mapping of AIGKC fishing effort onto known/modeled distribution of sensitive habitats.
- 2) Review of spatial distribution of AIGKC pot fishing effort in relation to spatial closures.
- 3) Quantifying coral bycatch rates and trends using observer data from the AIGKC fishery.

With respect to part #1 of the CAP, the update from BSCCG indicates that this action is ongoing. It describes progress made to resolve concerns about the confidentiality of data. No new quantitative information is given but the described action is essential for completing part #1 of the CAP. BSCCG intends to provide an update on part #1 as soon as possible. The assessment team should request to see quantitative data in advance of the next surveillance audit. **Conclusion:** on target.

With respect to part #2 of the CAP, the BSCCG update provides the team with a review of overlap between the AIGKC fishery and the AI spatial closures that were enacted to protect sensitive habitats. Quantitative information is presented on the spatial distribution of AIGKC fishing effort in relation to closure areas. Monitoring data from 17,000 GKC pots observed over the period from 2007 (after the closures took effect) through 2017 indicate that the closures are fully implemented (compliance is > 99.8%; possibly approaching 100% after excluding two erroneous GPS positions). Thus, the actions described under part #2 of the CAP have now been completed by the client and are accepted by the surveillance team. **Conclusion:** completed.

With respect to CAP part #3, the update provides the team with a first multi-year (2007-2017) summary of the ADFG observer data for coral bycatch in the AIGKC fishery. The bycatch summary is necessarily preliminary and brief. It does not elaborate on species compositions, quantity of bycatch (no. or pieces or wt. per pot), or other qualitative factors and there are concerns about the consistency of data collection/handling over time. This may prevent BSCCG from doing a "before and after comparison" of bycatch rates relative to area closures as originally envisioned. It is the team view, that it may be more desirable to relate observations on coral bycatch incidence rates to results of CAP part#1. Regardless, the update demonstrates progress towards completing the agreed action. **Conclusion:** on target

In summary, it is the team view that the update describes satisfactory progress made by the client to address NC#2 according to the agreed time frame.



Date: January 25, 2019

From: Bering Sea Crab Client Group (BSCCG)  
Mr. Scott Goodman (Executive Director)  
Bering Sea Fisheries Research Foundation (BSFRF)  
4039 21<sup>st</sup> Avenue W, Suite 404  
Seattle, WA 98199  
(BSCCG is wholly owned subsidiary of BSFRF)

To: Dr. Ivan Mateo, Ph.D  
Fisheries Assessment Officer  
3<sup>rd</sup> Floor, Block 3  
Quayside Business Park  
Mill Street, Dundalk  
Co. Louth, Ireland

RE: Update on Corrective Action Plan – for minor non-conformances in the Aleutian Islands Golden King Crab Unit of Assessment. Ref: fm13/AK/CRA/2017  
(Conducted as part of U.S. Alaska Bering Sea and Aleutian Islands King, Tanner and Snow Crab Commercial Fisheries – Re and Full Assessments, 2018/19)

Dear Dr. Mateo,

Please find this summary below to be an update of our collaborative work to address the three Action Plan items referenced in August 2017. I have included the Action Plan (dated 08/31/17) with attachments as reference below, also. The items covered in this update address summary information from spatial review of bycatch in the AIGKC fishery, specifically with reference to documented bycatch of sensitive species (coral, etc.) and compliance with area closures. These items are #s 2 and 3 in the Action Plan. We are continuing to work on Action Plan Item #1 (a complete historical spatial review) and will provide an update on that as soon as possible. We have discussed some of the detailed work steps involved in spatially reviewing the fishing activity, which is confidential based on State of Alaska policies for data from 3 or fewer entities. The fishermen have agreed to sign waivers of confidentiality for other related spatial research in the area, but we expect this will allow us to conduct a more comprehensive review in the near future to monitor the efficacy of current closures and bycatch rates in open areas.

#### Action Plan Item 2: Update of recent fishing season effort in proximity to closure areas

In collaboration with Dr. Chris Siddon and staff (ADFG, Juneau) we have completed a review of the updated charting of AIGKC pot fishing effort overlain with the closure areas (6 polygonal no-fishing areas). Figure 1 below is directly from ADFG staff and continues to reflect a high degree of compliance of no fishing activity within the closed areas. There are approximately 17,000 GKC pots observed over the period after the closures went into effect through the most recently available data (2007-2017). In 2013, there are two (2) observed pots that plot inside the southern-most closure area. Compliance rates of observed pots outside the closure areas are 99.99% over the whole period and 99.88% in 2013. We reviewed the information with Dr. Siddon and ADFG staff and have concluded that observations for the 2 pots of interest may contain positional errors. Our discussions noted that some imprecision or erroneous records in recorded latitude and longitude can reflect pots plotting on land, so it may be that

these records are simply errors. Further, part of required compliance during AIGKC fishing operations is an active vessel monitoring system (VMS) which documents each boat's activity with a high degree of positional precision, especially adjacent to closed or sensitive areas. We consulted with all fishermen in the stakeholder group and further with ADFG Westward Region staff (Kodiak and Dutch Harbor) and have found no evidence of a VMS reporting of activity inside the closed area of interest.

**Action Plan Item 3: A review of AIGKC observer pot bycatch data for coral species to evaluate trends in bycatch CPUE**

In collaboration with ADFG staff in Juneau, we have completed a brief review of the bycatch database from the AIGKC observer data over the period of interest (2007-2017). Importantly, this review was provided as a preliminary summary, contains some confidential information, but has been summarized by year to aggregate fishing activity. Figure 2 below shows the email and table from Mr. L. Hulbert (ADFG, Juneau) in response to our review. As we reported in our preparations of the Action Plan, the coral bycatch rates are variable, but appear to be declining over the recent seasons. On average, the summary suggests that about 28% of observed pots have coral bycatch. Coral bycatch, as defined in the observer records, has not been further reviewed at this time to ascertain relative differences between pots with single or many pieces of coral, or any other qualitative factors that may help with further understanding of documented bycatch. We have not conducted a review of these incidence rates further back in time to compare periods before and after the spatial closures. ADFG staff have reported that both database methods and staff tasking have influenced the consistency of the records available to complete a consistent review of "before and after" coral bycatch rates. Nonetheless, we would propose that during a broader spatial review completed as part of Action Plan item 1, we could attempt to provide a summary from the available information to note how the closures and current monitoring are reducing the AIGKC pot fishing bycatch and impacts on sensitive habitats.

We look forward to providing you with further Action Plan updates and continuing toward full compliance for the AIGKC pot fishery. We hope this information will assist with your surveillance and review. Please let me know if there are further questions you may have at this time.

Sincerely,

BERING SEA CRAB CLIENT GROUP LLC



Scott Goodman (BSFRF, Executive Director)

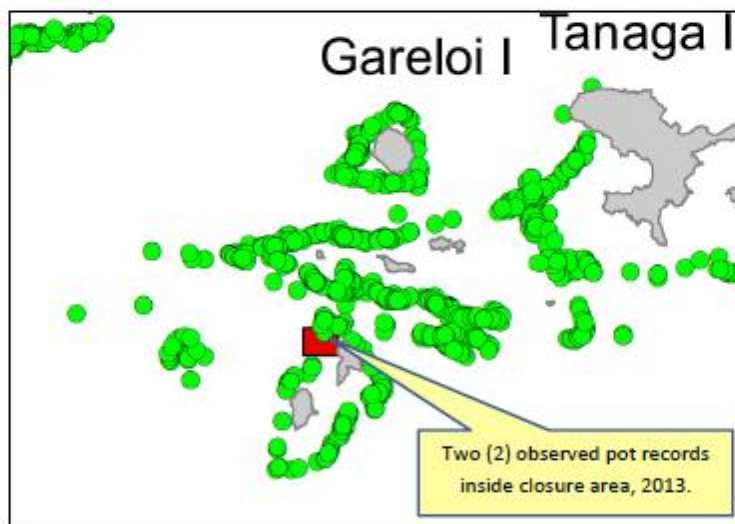
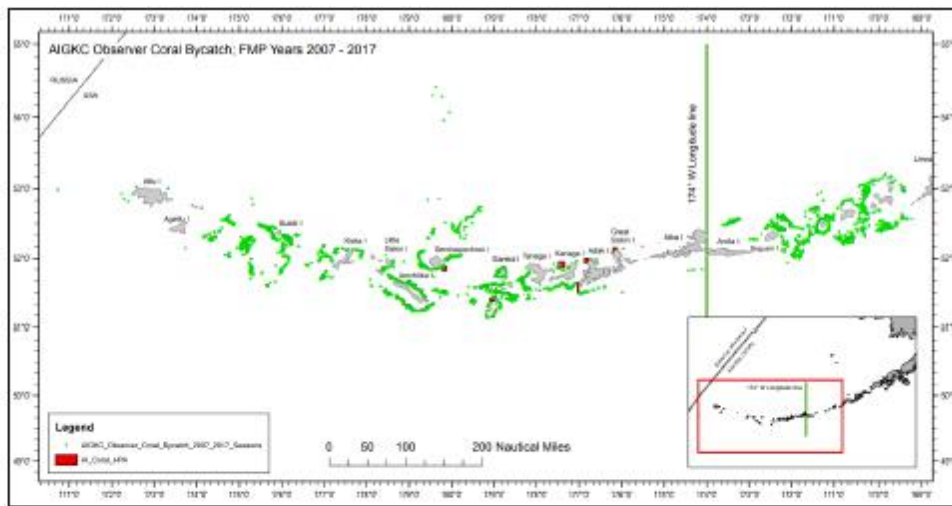


Figure 1. Updated spatial plot of AIGKC pot effort in proximity to AI Coral Closure Area, 2007-2017 (top panel total area, bottom panel zoomed into red closure area adjacent to Ulak Island [southern-most closure]. Source: ADF&G, C. Siddon, L. Hulbert (Spatial data may be confidential).

**From:** Hulbert, Leland B (DFG) <[lee.hulbert@alaska.gov](mailto:lee.hulbert@alaska.gov)>  
**Sent:** Monday, December 17, 2018 2:47 PM  
**To:** Siddon, Chris E (DFG) <[chris.siddon@alaska.gov](mailto:chris.siddon@alaska.gov)>  
**Subject:** RE: "new" project

I forgot to run the remove duplicates routine on that last one – got ahead of myself.

This is from the duplicates removed table.

FMP Year	Observer Pot Count -	Pots with Coral Count -	Percent of Pots with
	ALL	ALL	Coral
2007	2080	467	22.45%
2008	1592	364	22.86%
2009	1301	452	34.74%
2010	1303	450	34.54%
2011	1198	304	25.38%
2012	1547	462	29.86%
2013	1720	574	33.37%
2014	1513	517	34.17%
2015	1774	464	26.16%
2016	1675	430	25.67%
2017	1393	346	24.84%

Leland B. Hulbert  
 Alaska Department of Fish and Game  
 Commercial Fisheries Division  
 HQ - Juneau  
 907-465-6123

**Figure 2.** Tabular summary of AIGKC pot coral bycatch as recorded in the ADFG observer bycatch database, 2007-2017. Source: ADF&G, C. Siddon, L. Hulbert [12/17/18 email] (summarized data may be confidential).

With respect to outcome indicators for avoiding impacts to essential habitats, it should be noted that the Council and NMFS have made further progress in assessing fishing impacts to EFH. In 2017, the NPFMC evaluated updates to EFH in its FMPs, as required by MSA, to make use of new, model-based descriptions of EFH for Bering Sea, Aleutian Islands, and Gulf of Alaska groundfish and crab. The EFH update also included an updated assessment of the adverse impacts of non-fishing and fishing activities on EFH that made use of a three-tiered Fishing Effects (FE) model (NPFMC 2017). Results of the FE model were delivered to stock assessment authors for each species in the GOA and BSAI FMPs. Authors were asked to evaluate whether the current impacts of fishing on EFH presented the potential for impacts that were more than minimal or not temporary. Results for BSAI crab stocks are summarized in Table 9 below.

**Table 9.** Summary of stock assessment author evaluations of the effects of fishing on EFH for crabs in the Bering Sea and Aleutian Islands.

Species	Stock < MSST	Average % CEA Disturbed	% CEA Disturbed Nov 2016	Management Change
Pribilof Islands Blue King Crab	Y	<1.0	0.7	N
St. Matthew Blue King Crab	N	<1.0	0.2	N
Bristol Bay Red King Crab	N	<5.0	2.9	N
Pribilof Islands Red King Crab	N	<1.0	0.4	N
Norton Sound Red King Crab	N	NA	NA	N*
Western Aleutian Islands Red King Crab	NA	NA	NA	N*
Aleutian Islands Golden King Crab	NA	<5.0	2.1	N
Pribilof Islands Golden King Crab	NA	NA	NA	N*
Snow Crab	N	<5.0	0.8	N
Tanner Crab	N	<9.0	5.1	N

\* Recommend future work with analysts to identify data available for GAM and FE analysis.

The consensus among authors was that none of the crab stocks habitat reduction within the Core EFH Area (CEA) was greater than 10% when appropriate data was available to make the assessment. In most cases, reduction of CEA was less than 10%. For example, “habitat reduction in the Aleutian Islands Golden King Crab CEA did not exceed 5 percent from 2003 – 2016.” Representatives of the BSAI Crab Plan Team concurred with the authors’ assessments and therefore no changes to management of essential fish habitat were recommended for any fisheries. However, the BSAI Crab Plan Team noted that future efforts need to assess the importance of smaller local habitat scales on overall stock health especially when you have areas showing >50% habitat reduction even though the overall habitat reduction average is <10% (e.g. southwest Bristol Bay).

The Council and NMFS have also made progress with respect to outcome indicators for avoiding impacts to vulnerable habitats. The FE model used in the EFH five-year review process (described above) was adjusted to accommodate and examine fishing effects on corals (section 10.3.6 in Simpson et al. 2017)<sup>112</sup>. During Council review, the SSC raised concern that the longest recovery time incorporated into the model (10 years) may not capture the recovery needed for long-lived species like some hard corals that live on rocky substrate at deep depths. The authors of the model explained that recovery is addressed in the model as an exponential decay function and that 10 years is a recovery to 50% of original coral biomass; a site would recover to 80% of the original biomass after 34 years in the absence of further damage or removals. However, to further address these concerns, a deep and rocky substrate habitat category was added using published information from Stone (2014). This study was focused on the central Aleutian Islands, but is the most comprehensive source of information on corals in Alaska. Results indicate that corals have the highest density and depths of 400-700m, on bedrock or cobbles, with moderate to very high roughness, and slopes greater than 10 percent.

<sup>112</sup> <https://alaskafisheries.noaa.gov/habitat/efh>

To account for long-lived species expected to be found in these habitats, a new “Long-Lived Species” habitat feature was added with a new recovery score of “4”, corresponding to a recovery time of 10-50 years. The 50-year upper limit of recovery time was calculated with the expectation that 5% of the long-lived species would require 150 years to recover. Inclusion of this new category resulted in an average increase of 0.03% more habitat in a disturbed state compared to the original model predictions. Predicted habitat reduction was about 70% less in grid cells that contained Deep/Rocky substrate compared to the entire domain, reflecting the reduced fishing effort in those areas.

#### 12.14. Outcome indicator(s) and management objectives for dependent predators.

There are outcome indicators consistent with achieving avoidance of severe adverse impacts on dependent predators resulting from fishing on BSAI crab stocks (e.g. as described in supporting clause 12.12 with regard to indicators for marine mammals). However, available evidence (Chilton et al. 2011) indicates that the BSAI crab stocks under consideration here are not key prey species whose removal adversely impacts on dependent predators. In addition, ongoing programs for monitoring of outcome indicators ensures that adverse impacts to dependent predators do not arise.

#### 12.15. Outcome indicator(s) and management objectives that seek to minimize adverse impacts of the unit of certification, including any enhancement activities, on the structure, processes and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible.

There are outcome indicators specific to the BSAI King and Tanner Crab fisheries which are used to assess impacts to aquatic ecosystems. These indicators are termed ‘Crab Ecosystem Considerations Indicators’ (CECI) and they are described in the CECI report by Chilton et al. (2011).<sup>113</sup> The CECI report is composed of three main sections: Ecosystem Assessment, Current Status of Ecosystem Indicators (information on the physical and biological components of the BSAI ecosystem), and Ecosystem-based Management Indicators. The latter section provides trends which could indicate early warning signals of direct fishery effects on crab-oriented BSAI ecosystem components, warranting management intervention or providing evidence of the efficacy of previous management actions. Specific indicators include the magnitude of directed fishery effects on BSAI habitat and resulting management efforts, and spatial and temporal removals of the target catch affecting other biological predators. Outcome indicators in the CECI report are consistent with achieving management objectives of identifying and minimizing adverse impacts of BSAI crab fisheries on aquatic ecosystems.

In addition, managers utilize outcome indicators which are applied more broadly to the monitoring of the Alaska’s fisheries and marine ecosystems, as described in Alaska Marine Ecosystem Status Reports<sup>114</sup> (prior to 2018, these documents were called ‘Ecosystems Considerations Reports’). “The goals of the Ecosystem Status Reports are to (1) provide stronger links between ecosystem research and fishery management and (2) spur new understanding of the connections between ecosystem components by bringing together the results of diverse research reports into one document.” A wide array of indicators is utilized to assess physical and environmental trends, ecosystem trends, and fishing and fisheries trends. The indicators are broadly grouped into Ecosystem Status Indicators, organized by trophic level, and Fishing and Human Dimensions Indicators, organized around objective categories derived from U.S. legislation and current management practices. Ecosystem Status Reports are updated annually (e.g. see Zador and Ortiz 2018 and Siddon and Zador 2018 for Bering Sea and Aleutian Islands, respectively) and the reports are accessible via Council<sup>115</sup> and AFSC websites.<sup>116</sup>

<sup>113</sup> [http://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/CrabSAFE/511Chapters/Ecosystem\\_CrabSAFE.pdf](http://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/CrabSAFE/511Chapters/Ecosystem_CrabSAFE.pdf)

<sup>114</sup> <https://access.afsc.noaa.gov/reem/ecoweb/index.php>

<sup>115</sup> [https://www.afsc.noaa.gov/refm/stocks/plan\\_team/2018/NovDraftDocs\\_2018.htm](https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/NovDraftDocs_2018.htm)

<sup>116</sup> <https://access.afsc.noaa.gov/reem/ecoweb/index.php>

Taken together, there is strong evidence that management utilizes outcome indicators consistent with achieving management objectives that seek to minimize adverse impacts of BSAI crab fisheries on the structure, processes and function of aquatic ecosystems that are likely to be irreversible or very slowly reversible

### 8.6.2. Fundamental Clause 13

Where fisheries enhancement is utilized, environmental assessment and monitoring shall consider genetic diversity and ecosystem integrity.

<b>Number of Supporting clauses</b>	<b>19</b>
<b>Supporting clauses applicable</b>	<b>0</b>
<b>Supporting clauses not applicable</b>	<b>19</b>
<b>Overall level of conformity</b>	<b>Full Conformity</b>
<b>Non Conformances</b>	<b>0</b>

#### Summarized evidence:

13.1. States shall promote responsible development and management of aquaculture, including an advanced evaluation of the effects of aquaculture development on genetic diversity and ecosystem integrity, based on the best available scientific information.

As detailed more fully in the BSAI Crab RFM Re-assessment Report<sup>117</sup>, BSAI King and Tanner Crab Fisheries are not enhanced fisheries and there are no associated aquaculture developments. The Alaska King Crab Research, Rehabilitation and Biology (AKCRRAB) Program continues to research the feasibility of red and Blue King Crab restoration work as outlined in the AKCRRAB Strategic Plan<sup>118</sup>. However, no facilities are currently permitted by ADFG for the release of cultivated crab (exclusive of scientific investigations). Interviews during the second surveillance audit reconfirmed the determination that BSAI crab fisheries are not enhanced (pers. comm. R. Foy and F. Bowers). Therefore, Fundamental Clause 13 is not applicable.

13.2. State shall produce and regularly update aquaculture development strategies and plans, as required, to ensure that aquaculture development is ecologically sustainable and to allow the rational use of resources shared by aquaculture and other activities.

NA

13.3. Effective procedures specific to aquaculture of fisheries enhancement shall be established to undertake appropriate environmental assessment and monitoring, with the aim of minimizing adverse ecological changes (such as those caused by inputs from enhancement activities and related economic and social consequences).

NA

13.4. Stock assessment of enhanced fisheries consideration of separate contributions from aquaculture and natural production.

NA

13.5. Habitat modifications for the purposes of enhancement do not cause serious or irreversible harm to the natural ecosystem's structure and function.

NA

13.6/13.7/13.8. Aquaculture practices and transboundary ecosystems including introduction of non-indigenous species.

<sup>117</sup> <https://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-crab/>

<sup>118</sup> <https://seagrant.uaf.edu/research/projects/kingcrab/general/>



NA

13.9. State shall establish appropriate mechanisms, such as databases and information networks to collect, share and disseminate data related to their aquaculture activities to facilitate cooperation on planning for aquaculture development at the national, sub-regional, regional and global level.

NA

13.10. State shall cooperate in the elaboration, adoption and implementation of international codes of practice and procedures for introductions and transfers of aquatic organisms.

NA

13.11. Practices/procedures/national codes of practice and procedures in the selection and genetic improvement of broodstocks, introduction of non-native species, and production, sale and transport of eggs, larvae, fry, broodstock or other live materials.

NA

13.12. Management of aquaculture production for stocking purposes.

NA

13.13. Where applicable, enhanced fisheries shall meet the following criteria:

- the species shall be native to the fishery's geographic area or introduced historically and have subsequently become established as part of the "natural" ecosystem;
- there shall be natural reproductive components of the "stock under consideration";
- the growth during the post-release phase shall be based upon food supply from the natural environment and the production system shall operate without supplemental feeding.

NA

13.14. In the context of avoiding significant negative impacts of enhancement activities on the natural reproductive components of "stock under consideration":

- naturally reproductive components of enhanced stocks shall not be overfished;
- naturally reproductive components of enhanced stocks shall not be substantially displaced by stocked components. In particular, displacement shall not result in a reduction of the natural reproductive stock component below abundance-based target reference points (or their proxies) defined for the regulation of harvest.

N/A

## 9. Performance specific to agreed corrective action plans

One minor non-conformance is open for the Aleutian Islands Golden King Crab unit of certification. A medium confidence rating and consequent minor non-conformance was issued under:

### Fundamental Clause 12:

*Considerations of fishery interactions and effects on the ecosystem shall be based on best available science, local knowledge where it can be objectively verified and using a risk based management approach for determining most probable adverse impacts. Adverse impacts of the fishery on the ecosystem shall be appropriately assessed and effectively addressed.*

### Supporting Clause 12.13:

*There shall be outcome indicator(s) consistent with achieving management objectives for avoiding, minimizing or mitigating the impacts of the unit of certification on essential habitats for the “stock under consideration” and on habitats that are highly vulnerable to damage by the fishing gear of the unit of certification.*

### **Details of Non-conformance:**

Non-Conformance #2 (MINOR non-conformance: Clause 12.13)

With respect to the AI Golden King Crab unit of certification, the spatial distribution of pot fishing effort in relation to vulnerable habitats is unclear but may be extensive in some areas. Predictive models of coral and sponge distribution have been developed for the Aleutian Islands. However no spatial analysis is yet available which would allow an estimation of current and historic overlap of AIGKC pot fishing effort with the distribution of vulnerable coral and sponge habitats in the Aleutian Islands.

A corrective action plan from the client shall detail,

1. How Bering Sea Crab Client group intends to address these non-conformances.
2. A set of specific timelines to allow for assessment during the next surveillance activities in 2018, 2019 and 2020 and the second full assessment audit in 2021, as relevant and if needed.

This NC will remain open throughout the period of certificate validity (5 years) until the confidence level can be re-assigned to a ‘high’ level based on evidence of effective implementation of corrective actions

### Surveillance Update:

This is the second surveillance assessment following re-assessment of the BSAI crab fisheries which was completed on December 7, 2017. Some progress has been made according to the Client Action Plan. However, the actions taken are not yet sufficient to be considered fulfillment of the minor non-conformance.

## 10. Unclosed, new non-conformances and new corrective action plans

### 10.1. New Non conformances

One new minor non-conformance has been raised for the St Matthew Island Blue King Crab unit of certification. A medium confidence rating and consequent minor non-conformance is issued under:

#### Fundamental Clause 6:

*The current state of the stock shall be defined in relation to reference points or relevant proxies or verifiable substitutes allowing for effective management objectives and targets. Remedial actions shall be available and taken where reference point or other suitable proxies are approached or exceeded*

#### Supporting Clause 6.3:

*Data and assessment procedures shall be installed measuring the position of the fishery in relation to the reference points. Accordingly, the stock under consideration shall not be overfished (i.e. above limit reference point or proxy) and the level of fishing permitted shall be commensurate with the current state of the fishery resources, maintaining its future availability, taking into account that long term changes in productivity can occur due to natural variability and/or impacts other than fishing.*

#### **Details of Non-conformance:**

Non-Conformance #3 (MINOR non-conformance: Clause 6.3)

The RFM Program provides assessment teams with guidance for scoring clause 6.3 which consists of three evaluation parameters: process; current status/appropriateness/effectiveness; and evidence basis. With respect to the first evaluation parameter, we find strong evidence of conformity because the Council process has been followed and the stock assessment was conducted according to procedure using the appropriate datasets to measure the position of the fishery in relation to its limit reference point (MSST). With respect to the third evaluation parameter, we find strong evidence of conformity because the stock assessment of SMBKC, as documented in the SAFE report, was based on high-quality information. With respect to the second evaluation parameter, however, we find that the stock under consideration (SMBKC) does not meet the RFM criterion for current status/appropriateness/effectiveness because the stock is below its limit reference point and therefore designated as 'overfished' (NMFS Letter to NPFMC, Oct 2018). Consequently, clause 6.3 is lacking in one evaluation parameter and must therefore be assigned a medium confidence rating. A minor non-conformity is raised.

A corrective action plan from the client shall detail;

1. How Bering Sea Crab Client group intends to address these non-conformances, and
2. a set of specific timelines to allow for assessment during the next surveillance activities in 2019, 2020 and the second full assessment audit in 2021, as relevant and if needed.

This NC will remain open throughout the period of certificate validity (5 years) until the confidence level can be re-assigned to a 'high' level based on evidence of effective implementation of corrective actions.

### 10.2. New Corrective Action Plan

On March 21 2019 the team received a new corrective action plan prepared for the NC raised for clause 6.3. The team reviewed the corrective action plan and provided comments to the client. Finally the client provided a revised client action plan on April 10 2019 that was approved by the assessment team.

Date: April 5, 2019

From: Bering Sea Crab Client Group (BSCCG)  
Mr. Scott Goodman (Executive Director)  
Bering Sea Fisheries Research Foundation (BSFRF)  
4039 21<sup>st</sup> Avenue W, Suite 404  
Seattle, WA 98199  
(BSCCG is wholly owned subsidiary of BSFRF)

To: Dr. Ivan Mateo, Ph.D  
Fisheries Assessment Officer  
3<sup>rd</sup> Floor, Block 3  
Quayside Business Park  
Mill Street, Dundalk  
Co. Louth, Ireland

RE: Preliminary Corrective Action Plan – for minor non-conformances in the St. Matthew Blue King Crab Unit of Assessment. Ref: AK/CRA/002.2/2018  
(Conducted as part of U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow Crab Commercial Fisheries – Re and Full Assessments, 2018/19)

Dear Dr. Mateo,

Please find this summary below to be our summary of preliminary options that we would expect to take as part of a Corrective Action Plan (CAP) for the assessment team's recent finding of a medium-rated, minor non-conformance for the St. Matthew blue king crab (SMBKC) stock. We have reviewed the team's documentation supporting their review and understand that the official "overfished" designation of SMBKC stock has led to these results and triggered this CAP and steps. We agree with the team's findings but have some uncertainty as a client group with the magnitude of steps which might be taken under a CAP. This mostly stems from recent management of the stock which has now had three successive season closures, close monitoring through surveys, fully compliant observer coverage (to document incidental bycatch), and further development and refining of the SMBKC stock assessment model itself.

The shared Federal (NOAA) and State (ADF&G) management occurs under the authority of the Magnuson Stevens Act (MSA) which has prescriptive measures to set official steps toward rebuilding overfished stocks. We know the assessment team is aware of the early steps and progress under Magnuson "Rebuilding Plan" requirements. Our proposed action steps outlined below are essential to take a top-down approach in participating, reviewing and reporting back to the assessment team as further information is shared in three areas; rebuilding plan progress, stock assessment refinement, and incidental bycatch monitoring and reporting.

#### **Action Plan Item 1: Support of and Attention to St. Matthew Blue King Crab Rebuilding Plan**

The assessment team referred to the NPFMC letter from October 2018, which officially started the "overfished" designation and process for SMBKC stock. We are well aware of the cyclic, dynamic nature of Alaskan crab stocks and have unfortunately been through this process before; snow crab (declared

overfished 1999, rebuilt 2011), Tanner crab (declared overfished 2011, rebuilt 2012) and SMBKC (last declared overfished 1999, rebuilt 2008).

The current SMBKC designation came as part of the normal review process between State and Federal managers through information shared at the September 2018 Crab Plan Team, subsequent NPFMC Council meetings, and more recently, the January 2019 CPT in Nome, AK. We note for the team that CPT meetings follow rigorous peer review of crab stock status which are followed by the Council's Scientific and Statistical Committee (SSC) review as a final peer review before management actions. State and Federal managers are compliant with and follow a robust process towards precaution when warranted by concern for a declining or low abundance stock. The team's review noted the strong evidence of conformity to all aspects of process.

For our proposed action step, we would report back to the assessment team prior to, or during, their next surveillance activities on all important rebuilding plan and status updates. We have a regular presence at these management meetings to both listen and participate as primary stakeholders in the commercial crab stocks of interest. The initial time frame for the development and approval of a SMBKC rebuilding plan is two years, and much can happen which may change the context of plan development or even the status of the SMBKC stock (reference to bairdi). The next CPT meeting is scheduled for April 29 – May 3, 2019. As a part of preliminary reporting, please see the attached presentation summary timeline materials in Figure 1 below. Elements that we would cover in reporting would include those items mentioned by both the Crab Plan Team (January, Nome) and SSC (February, Anchorage) in Figure 2.

#### **Action Plan Item 2: Support of and Participation in SMBKC Stock Assessment – GMACs Support**

The Generic Models for Alaskan Crab (GMACs) program was originally initiated by a collaboration of the stakeholder group BSFRF which has client ownership of BSCCG. The GMACs progress has been slow over the last several years, but BSFRF/BSCCG support with NOAA/ADF&G and others has persisted. Importantly, the SMBKC stock has been the first of the Alaskan stocks to utilize and rely on GMACs for approved management action. While most of the SMBKC GMAC technical modeling work has been completed over the last two years by UW and NOAA researchers (Dr. A. Punt and Dr. J. Ianelli), the current stock assessment has been passed to State (ADF&G) managers (K. Palov). We have been attentive to the utility provided by GMACs to SMBKC stock status evaluation and concur with the stock assessment scientists and current high level of concern. Moreover, we would note that our support and funding of portions of the GMAC project have led to the current level of review and precaution in managing this stock.

As our second proposed action step, we are committing to continue support of the GMACs as a project for all Alaskan crab, but specifically to SMBKC, with the intent of continued work to more accurately and precisely specify the mature male biomass (MMB), overfishing level (OFL) and allowable biological catch (ABC), as well as GMAC, generated projections completed as part of rebuilding terms. The assessment team should note that most of this work will occur within ADFG/NOAA oversight and process, but BSFRF/BSCCG will continue to support any opportunity that may be appropriate (workshops, coding supplementary work, consulting expertise, etc.)..

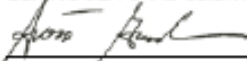
**Action Plan Item 3: Record Keeping & Reporting for SMBKC Stock – Bycatch Monitoring**

As a final action step, due to no SMBKC directed fishery occurring over the last three seasons, any substantial bycatch reduction activity would be indirect and outside of the purview of BSCCG as a client group of crab pot fishery stakeholders. Further, we would note that management summaries indicate that the only SMBKC bycatch from directed crab pot fishing comes during snow crab fishing and has generally been negligible for the last several years. Lastly, the CPT and SSC note that bycatch overall does not appear to be a significant driver in stock status review, but will nonetheless be considered for its influence in rebuilding plan options. We would, however, propose a preliminary action step to report any new bycatch activity that may occur in crab or non-crab fisheries in the SMBKC management area. Importantly, any SMBKC bycatch will be covered by current management (observer record keeping and reporting), but we may become aware of events before they are officially available.

In summary we have included a Timeline and Milestones table below which we hope clarifies the important events through the next couple of years as further surveillance work is completed. We look forward to providing you with further Action Plan updates and continuing toward full compliance for the SMBKC stock. We hope this information will assist with your surveillance and review. Please let me know if there are further questions you may have at this time.

Sincerely,

BERING SEA CRAB CLIENT GROUP LLC



Scott Goodman (BSFRF, Executive Director)

BSCCG CAP Items & Timeline Summary		Milestones / Evidence	
CAP Item #	CAP Item Description	CAP Year 1 - Dec 2019 (3rd Surveillance Audit)	CAP Year 2 - Dec 2020 (4th Surveillance Audit)
1	BSCCG to report on the development of a rebuilding plan (RBP) for SMBKC	Provide evidence that RBP is under development	Provide evidence that RBP has been completed and implementation is underway
2	BSCCG to support the continued application and development of GMACs for SMBKC assessment	Provide evidence that GMAC use and development is improving SMBKC assessment/status determination	Provide evidence that GMAC use and development is improving SMBKC assessment/status determination
3	BSCCG to monitor and report on SMBKC bycatch	Provide evidence of ongoing recordkeeping of SMBKC bycatch	Provide evidence of ongoing recordkeeping of SMBKC bycatch

CAP = Corrective Action Plan, GMAC = Generic Models for Alaskan Crab

## Analyses and Plans for Winter/Spring 2019

### Assessment

- Transfer assessment and projection code to ADFG [late Feb - Andre/ADFG]
- B<sub>MSY</sub> time frame [ADFG]
  - Log Recruit per spawner analysis to evaluate changes in productivity over time (similar to Jie's BBRKC examination)
  - Proposed changes to BMSY time frame: alternatives for inclusion in September final assessment
- Survey data review [ADFG]
  - Review of State and NMFS survey data, implications of offshore movement
  - VAST application to survey data

### Rebuilding Plan

- Revised projections [Andre/ADFG/Diana]
  - Updated projections following Feb SSC; revised alternative projections consistent with proposed B<sub>MSY</sub> alternatives
- Review of previous rebuilding plans [Diana]
  - Changes to assessment methodology and reference points since then
- Bycatch data review [Diana/NMFS]
  - Spatial locations of groundfish bycatch
  - Overlay existing area closures and review of rationale for closures
  - Size and sex composition of groundfish fishery bycatch

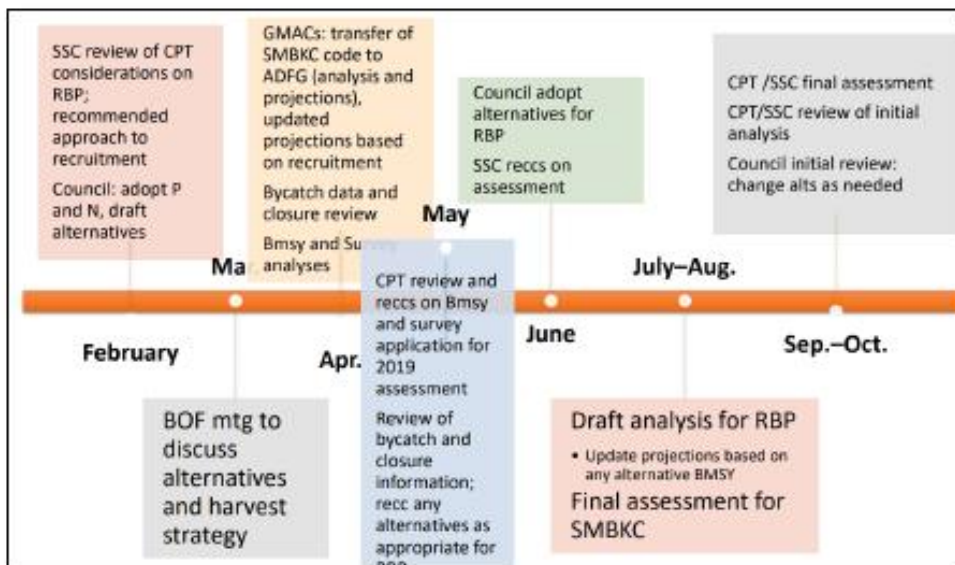


Figure 1. Summary materials depicting timeline and next steps in planning for SMBKC rebuilding plan from presentation to NPFMC SSC, February 2019.

### CPT INFO:

The Plan Team identified the following management actions that should be considered in the rebuilding plan: state harvest strategy revisions, area closures (include assessment of critical habitat areas relative to groundfish fishing locations), and PSC limits. CPT members identified several topics for discussion and action recommendations be addressed at the May 2019 meeting.

1. Explore current state and federal closures and rationale for those closures. Currently state waters (0-3 nmi) surrounding St Matthew, Hall, and Pinnacle Islands are closed to fishing. Additionally, the federal St. Matthew Island habitat conservation area is closed to non-pelagic trawl vessels. The Plan Team would like to review the history and rationale for implementation of these closure areas and whether additional closures would be beneficial. Although bycatch mortality in the fixed gear groundfish fisheries is considered trivial in the stock assessment, preliminary analysis shows that it may be an impediment to rebuilding.
2. Review the spatial extent and size/sex composition of blue king crab groundfish bycatch in order to assess if fishing restrictions or additional area closure may be beneficial. Additionally, it may be helpful to look at the size/sex composition of discards in the most recent years of the directed fishery in order to assess area or habitat utilization of the stock.
3. Review information on habitat surrounding St Matthew Island.
4. Review information on the basis for *Ilow* for this and other king crab stocks.

### SSC INFO:

#### St. Mathew Blue King Crab Rebuilding

- Two-year timeline required for development and implementation of a rebuilding plan, which began in October 2018
- The SSC **encourages** consistency between the methods used for assessment/status determination and those for projecting future recruitment and therefore rebuilding reference points and trajectories
- The SSC **supports** using biological and life history information to weight methods for projecting future recruitment
- The SSC identified the choice of 1- or 2-year determination of 'rebuilt' status as a policy decision
- The SSC **requested** the CPT to report the role of bycatch and bycatch rates, by fishery, in the rebuilding analysis to the extent practicable
- The SSC looks forward to reviewing this analysis in June

Figure 2. Summary of information to provide updates to assessment team based on CPT and SSC recommendations (Jan-Feb 2019 meetings).



## 11. Future Surveillance Actions

The next assessment will be the 3<sup>rd</sup> surveillance assessment which will commence for the anniversary of the re-certification in December 2019. This 3<sup>rd</sup> surveillance will examine progress made in fulfilling the milestones of the corrective action plans.

## 12. Client signed acceptance of the action plan

The signed Client Action Plan, aligned to the previously NC raised on the reassessment was accepted by the assessment Team on 28th September 2017 (Complete details are outline in the full assessment report):

<https://uploads.alaskaseafood.org/2018/01/AK-RFM-BSAI-CRAB-Reassessment-v1-3-December-2017-Final.pdf>

The signed Client Action Plan, aligned to the new NC #3 raised on the 2<sup>nd</sup> surveillance audit of the reassessment was accepted by the assessment Team on 11 April 2019 (Complete details are outline in section 10.2).

### 13. Recommendation and Determination

Following this 2<sup>nd</sup> Surveillance Assessment, the assessment team recommends that continued Certification under the Alaska Responsible Fisheries Management Certification Program is maintained for the management system of the U.S. Alaska Bering Sea and Aleutian Islands King, Tanner, and Snow Crab commercial fisheries [Bristol Bay Red King Crab (*Paralithodes camtschaticus*), St. Matthew Island Blue King Crab (*Paralithodes platypus*), Eastern Bering Sea Tanner Crab (*Chionoecetes bairdi*), Aleutian Islands Golden King Crab (*Lithodes aequispinus*), and Eastern Bering Sea Snow Crab (*Chionoecetes opilio*)] legally employing pot gear within the U.S. EEZ off Alaska; therefore, continued Certification is awarded.

## 14. References

Reference	Hyperlink
ADFG (2017) 2017-2019 King and Tanner Crab Commercial Fishing Regulations. Alaska Department of Fish and Game.	<a href="http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/2017-2020_cf_king_tanner_crab.pdf">http://www.adfg.alaska.gov/static/regulations/fishregulations/pdfs/commercial/2017-2020_cf_king_tanner_crab.pdf</a>
AKCRRAB (2016) Alaska King Crab Research, Rehabilitation and Biology Program AKCRRAB: Strategic Plan 2015–2019. Approved January 15, 2016, 22 p.	<a href="https://seagrant.uaf.edu/research/projects/kingcrab/general/">https://seagrant.uaf.edu/research/projects/kingcrab/general/</a>
Alaska Fisheries Science Center (2016) Wholesale market profiles for Alaska groundfish and crab fisheries. 134 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.	<a href="https://www.afsc.noaa.gov/REFM/Socioeconomics/Default.php">https://www.afsc.noaa.gov/REFM/Socioeconomics/Default.php</a>
Barnard, D.R. and R. Burt 2008 Alaska Department of Fish and Game summary of the 2006/2007 mandatory shellfish observer program database for the rationalized crab fisheries. Alaska Department of Fish and Game, Fishery Data Series No. 08-17, Anchorage.	<a href="http://www.adfg.alaska.gov/FedAidPDFs/fds08-17.pdf">http://www.adfg.alaska.gov/FedAidPDFs/fds08-17.pdf</a>
Chilton, E.A., K.M. Swiney, J.D. Urban, J.E. Munk, and R.J. Foy 2011 Ecosystem consideration indicators for Bering Sea and Aleutian Islands King and Tanner Crab Species NOAA NMFS AFSC, 2011.	<a href="http://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/CrabSAFE/511Chapters/Ecosystem_CrabSAFE.pdf">http://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/CrabSAFE/511Chapters/Ecosystem_CrabSAFE.pdf</a>
CPT (2018) Crab Plan Team Report. North Pacific Fishery Management Council Crab Plan Team (CPT) Alaska Fisheries Science Center (AFSC) Seattle, WA September 10-13, 2018.	<a href="http://meetings.npfmc.org/CommentReview/DownloadFile?p=f5198732-ca4f-47e1-a4c1-e59b0ec553c1.pdf&amp;fileName=C1%20Crab%20Plan%20Team%20report%200918.pdf">http://meetings.npfmc.org/CommentReview/DownloadFile?p=f5198732-ca4f-47e1-a4c1-e59b0ec553c1.pdf&amp;fileName=C1%20Crab%20Plan%20Team%20report%200918.pdf</a>
Duffy-Anderson JT, Stabeno PJ, Siddon EC, Andrews AG, Cooper DW, Eisner LB, et al. (2017) Return of warm conditions in the southeastern Bering Sea: Phytoplankton - Fish. PLoS ONE 12(6): e0178955.	<a href="https://doi.org/10.1371/journal.pone.0178955">https://doi.org/10.1371/journal.pone.0178955</a>
Eich, A.M., K.R. Mabry, S.K. Wright, and S.M. Fitzgerald (2016) Seabird Bycatch and Mitigation Efforts in Alaska Fisheries Summary Report: 2007 through 2015. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-12, 47p.	<a href="https://alaskafisheries.noaa.gov/pr/seabird-bycatch-reports">https://alaskafisheries.noaa.gov/pr/seabird-bycatch-reports</a>
Eich, A.M., S.M. Fitzgerald, and J. Mondragon (2017) Seabird Bycatch Estimates for Alaska Groundfish Fisheries Annual Report: 2015. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-13, 31 p. doi:10.7289/V5/TM-F/AKR-13.	<a href="https://www.fisheries.noaa.gov/resource/document/seabird-bycatch-estimates-alaska-groundfish-fisheries-2015-annual-report">https://www.fisheries.noaa.gov/resource/document/seabird-bycatch-estimates-alaska-groundfish-fisheries-2015-annual-report</a>
Eich, A.M., J. Roberts, and S.M. Fitzgerald (2018) Seabird Bycatch Estimates for Alaska Groundfish Fisheries: 2016 through 2017. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-18, 32 p.	<a href="https://repository.library.noaa.gov/view/noaa/19471">https://repository.library.noaa.gov/view/noaa/19471</a>
Gaeuman, W.B. (2014) Summary of the 2013/2014 mandatory crab observer program database for the Bering Sea/Aleutian Islands commercial crab fisheries. Alaska Department of Fish and Game, Fishery Data Series No. 14-49, Anchorage.	<a href="http://www.adfg.alaska.gov/FedAidPDFs/FDS14-49.pdf">http://www.adfg.alaska.gov/FedAidPDFs/FDS14-49.pdf</a>
Garber-Yonts, B., and J. Lee., (2017) Stock Assessment and Fishery Evaluation Report for King and Tanner Crab Fisheries of the Bering Sea and Aleutian Islands Regions:	<a href="https://www.afsc.noaa.gov/refm/Socioeconomics/SAFE/crab.php">https://www.afsc.noaa.gov/refm/Socioeconomics/SAFE/crab.php</a>

Reference	Hyperlink
Economic Status of the BSAI Crab Fisheries, 2016.	
Global Trust (2017) Alaska Responsible Fisheries Management Certification: Full Assessment and Certification Report for the U.S. Alaska Bering Sea and Aleutian Islands King, Tanner and Snow Crab Commercial Fisheries, December 7, 2017, 376 p.	<a href="https://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-crab/">https://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-crab/</a>
Goddard P, Wilborn R, Rooper C, Williams K, Towler R (2017) Results of the 2012 and 2014 underwater camera survey of the Aleutian Islands. US Dept. Commer., NOAA Tech. Memo. NMFS-AFSC-351, 509 p.	<a href="https://deepseacoradata.noaa.gov/library/results-of-the-2012-and-2014-underwater-camera-surveys-of-the-aleutian-islands">https://deepseacoradata.noaa.gov/library/results-of-the-2012-and-2014-underwater-camera-surveys-of-the-aleutian-islands</a>
IPHC (2018) Report of the 94th Session of the IPHC Annual Meeting (AM094) Portland, Oregon, United States of America, 22-26 January 2018. IPHC-2018-AM094-R.	<a href="https://iphc.int/uploads/pdf/am/2018am/iphc-2018-am094-r.pdf">https://iphc.int/uploads/pdf/am/2018am/iphc-2018-am094-r.pdf</a>
Lang, C. A., J. I. Richar, and R. J. Foy (2018) The 2017 eastern Bering Sea continental shelf and northern Bering Sea bottom trawl surveys: Results for commercial crab species. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-372, 233 p.	<a href="https://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-372.pdf">https://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-372.pdf</a>
Limpinsel, D. E., Eagleton, M. P., and Hanson, J. L., (2017) Impacts to Essential Fish Habitat from Non-Fishing Activities in Alaska. EFH 5 Year Review: 2010 through 2015. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-14, 229p.	<a href="ftp://ftp.library.noaa.gov/noaa_documents.lib/NMFS/TM_NMFS_AFKR/TM_NMFS_FAKR_14.pdf">ftp://ftp.library.noaa.gov/noaa_documents.lib/NMFS/TM_NMFS_AFKR/TM_NMFS_FAKR_14.pdf</a>
MacLean, S.A., Rooper, C.N. and Sigler, M.F. (2017) Corals, Canyons, and Conservation: Science Based Fisheries Management Decisions in the Eastern Bering Sea. Front. Mar. Sci. 4:142. doi: 10.3389/fmars.2017.00142	<a href="https://www.frontiersin.org/articles/10.3389/fmars.2017.00142/full">https://www.frontiersin.org/articles/10.3389/fmars.2017.00142/full</a>
McConnaughey, R. A., K. E. Blackhart , M. P. Eagleton , and J. Marsh (2017) Habitat assessment prioritization for Alaska stocks: Report of the Alaska Regional Habitat Assessment Prioritization Coordination Team. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-361, 102 p.	<a href="https://repository.library.noaa.gov/view/noaa/15500">https://repository.library.noaa.gov/view/noaa/15500</a>
Magnuson–Stevens Fishery Conservation and Management Act (MSFCMA), commonly referred to as the Magnuson–Stevens Act (MSA). Enacted April 13, 1976. 16 U.S.C. §§ 1801-1884 as amended.	<a href="https://www.law.cornell.edu/uscode/text/16/chapter-38/subchapter-IV">https://www.law.cornell.edu/uscode/text/16/chapter-38/subchapter-IV</a>
McDowell Group (2017) The Economic Value of Alaska’s Seafood Industry. Prepared for Alaska Seafood Marketing Institute. September 2017. 38 p.	<a href="https://www.mcdowellgroup.net/wp-content/uploads/2017/10/ak-seafood-impacts-sep2017-final-digital-copy.pdf">https://www.mcdowellgroup.net/wp-content/uploads/2017/10/ak-seafood-impacts-sep2017-final-digital-copy.pdf</a>
Muto, M.M., V. T. Helker, R. P. Angliss, B. A. Allen, P. L. Boveng, J. M. Breiwick, M. F. Cameron, P. J. Clapham, S. P. Dahle, M. E. Dahlheim, B. S. Fadely, M. C. Ferguson, L. W. Fritz, R. C. Hobbs, Y. V. Ivashchenko, A. S. Kennedy, J. M. London, S. A. Mizroch, R. R. Ream, E. L. Richmond, K. E. W. Shelden, R. G. Towell, P. R. Wade, J. M. Waite, and A. N. Zerbini (2018) Alaska marine mammal stock assessments, 2017. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-378, 382 p.	<a href="https://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-378.pdf">https://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-378.pdf</a>
NIOSH (2016). Assessment of Safety in the Bering Sea/Aleutian Island Crab Fleet. By Lucas, D., Case, S.,	<a href="https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/Crab/AppendixC-">https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/Crab/AppendixC-</a>

Reference	Hyperlink
Teske, T., DeLeon, A., Kloczko, D., OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. National Institute for Occupational Safety and Health. DHHS, (NIOSH) Publication No. 2016-112.	<a href="#">SafetyBSAICrabFleetAssessment.pdf</a>
NMFS 2004 Bering Sea Aleutian Islands Crab Fisheries Final Environmental Impact Statement. NOAA NMFS, NPFMC. August 2004. 1003 p.	<a href="https://alaskafisheries.noaa.gov/sites/default/files/analyses/crabeis0804-chapters.pdf">https://alaskafisheries.noaa.gov/sites/default/files/analyses/crabeis0804-chapters.pdf</a>
NMFS (2018) Final Environmental Assessment for: Amendment 115 to the FMP for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area; Amendment 105 to the FMP for Groundfish of the Gulf of Alaska; Amendment 49 to the FMP for Bering Sea/Aleutian Islands King and Tanner Crabs; Amendment 13 to the FMP for the Salmon Fisheries in the Exclusive Economic Zone off Alaska; Amendment 2 to the FMP for Fish Resources of the Arctic Management Area. Essential Fish Habitat (EFH) Omnibus Amendments., June 2018.	<a href="https://alaskafisheries.noaa.gov/sites/default/files/analyses/efh-omnibus-amendments-ea0618.pdf">https://alaskafisheries.noaa.gov/sites/default/files/analyses/efh-omnibus-amendments-ea0618.pdf</a>
NOAA-AFSC (2018) AFSC Priorities and Annual Guidance for FY2018. NOAA Fisheries Alaska Fisheries Science Center. 6 p.	<a href="https://www.afsc.noaa.gov/program_reviews/2017/2017_Cor_e_Documents/FY18%20AFSC%20AGM.pdf">https://www.afsc.noaa.gov/program_reviews/2017/2017_Cor_e_Documents/FY18%20AFSC%20AGM.pdf</a>
NOAA-NMFS (1997) NOAA Fisheries Implementation Plan of the FAO Code of Conduct for Responsible Fisheries.	<a href="https://repository.library.noaa.gov/view/noaa/3063">https://repository.library.noaa.gov/view/noaa/3063</a>
NOAA-NMFS (2012) NOAA Fisheries Implementation Plan of the FAO Code of Conduct for Responsible Fisheries. January 2012.	<a href="https://repository.library.noaa.gov/view/noaa/4057/noaa_4057_DS1.pdf?">https://repository.library.noaa.gov/view/noaa/4057/noaa_4057_DS1.pdf?</a>
NPFMC (2007) Aleutian Islands Fishery Ecosystem Plan. Prepared by: K. Aydin, S. Barbeaux, F. Bowers, V. Byrd, D. Evans, S. Gaichas, C. Ladd, S. Lowe, J. Olson, J. Sepez, P. Spencer, F. Wiese. For North Pacific Fishery Management Council. December 2007. 198 p.	<a href="https://www.npfmc.org/aleutian-islands-fishery-ecosystem-plan/">https://www.npfmc.org/aleutian-islands-fishery-ecosystem-plan/</a>
NPFMC (2011) Fishery Management Plan for Bering Sea and Aleutian Islands King and Tanner Crabs. North Pacific Fishery Management Council. October 2011. 229 p.	<a href="https://www.npfmc.org/wp-content/PDFdocuments/fmp/CrabFMPOct11.pdf">https://www.npfmc.org/wp-content/PDFdocuments/fmp/CrabFMPOct11.pdf</a>
NPFMC (2017) Assessment of the effects of fishing on EFH in Alaska, April 2017. Prepared by Steve MacLean, Council staff, with input from M. Eagleton, J. Olson, M. Mackey. C6 Fishing Effects Discussion Paper. 22 p.	<a href="https://alaskafisheries.noaa.gov/habitat/efh">https://alaskafisheries.noaa.gov/habitat/efh</a>
NPFMC (2017) Ten-Year Program Review for the Crab Rationalization Management Program in the Bering Sea/Aleutian Islands. Final Draft: January 2017. 249 p.	<a href="https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/Crab/Crab10yrReview_Final2017.pdf">https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/Crab/Crab10yrReview_Final2017.pdf</a>
NPFMC (2018) Stock Assessment and Fishery Evaluation Report for the King and Tanner Crab Fisheries of the Bering Sea and Aleutian Islands Regions, 2018. Final Crab SAFE Compiled by The Plan Team for the King and Tanner Crab Fisheries of the Bering Sea and Aleutian Islands. North Pacific Fisheries Management Council. September 2018.	<a href="https://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports/">https://www.npfmc.org/safe-stock-assessment-and-fishery-evaluation-reports/</a>
NPFMC (2018) NPFMC Top Ten Research Priorities for 2018 and NPFMC Research Priorities for 2019-2023. North Pacific Fishery Management Council.	<a href="https://www.npfmc.org/research-priorities/">https://www.npfmc.org/research-priorities/</a>

Reference	Hyperlink
NPFMC (2018) Draft Bering Sea Fisheries Ecosystem Plan. C4 BS FEP, November 2018. North Pacific Fishery Management Council.	<a href="http://meetings.npfmc.org/CommentReview/DownloadFile?p=9fd5d027-86a8-4983-a7e7-f456acc478bf.pdf&amp;fileName=C4%20BS%20FEP.pdf">http://meetings.npfmc.org/CommentReview/DownloadFile?p=9fd5d027-86a8-4983-a7e7-f456acc478bf.pdf&amp;fileName=C4%20BS%20FEP.pdf</a>
Rooper, C.N., R. Wilborn, P. Goddard, K. Williams, R. Towler, G.R. Hoff (2018) Validation of deep-sea coral and sponge distribution models in the Aleutian Islands, Alaska. ICES Journal of Marine Science, 75(1):199-209. 1 January 2018	<a href="https://doi.org/10.1093/icesjms/fsx087">https://doi.org/10.1093/icesjms/fsx087</a>
Rooper, C., R. Stone, P. Etnoyer, C. Conrath, J. Reynolds, H.G. Greene, B. Williams, E. Salgado, C. Morrison, R. Waller, and A. Demopoulos (2017) Deep-Sea Coral Research and Technology Program: Alaska Deep-Sea Coral and Sponge Initiative Final Report. NOAA Tech. Memo. NMFS-OHC-2, 65 p.	<a href="https://www.fisheries.noaa.gov/alaska/habitat-conservation/deep-sea-corals-and-sponge-research-alaska">https://www.fisheries.noaa.gov/alaska/habitat-conservation/deep-sea-corals-and-sponge-research-alaska</a>
SAI Global (2017) Alaska Responsible Fisheries Management (RFM) Certification: 1st Surveillance Report for the U.S. Alaska Bering Sea and Aleutian Islands King, Tanner and Snow Crab Commercial Fisheries, June 19, 2018. 65 p.	<a href="https://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-crab/">https://www.alaskaseafood.org/rfm-certification/certified-fisheries/alaska-crab/</a>
Siddon, E. and S. Zador (Eds.) (2018) Ecosystem Status Report 2018: Eastern Bering Sea. November 2018, Council Draft. 230 p.	<a href="https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/NovDraftDocs_2018.htm">https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/NovDraftDocs_2018.htm</a>
Sigler, M. F., M. P. Eagleton, T. E. Helser, J. V. Olson, J. L. Pirtle, C. N. Rooper, S.C. Simpson, and R. P. Stone. (2017) Alaska Essential Fish Habitat Research Plan: A Research Plan for the National Marine Fisheries Service's Alaska Fisheries Science Center and Alaska Regional Office. AFSC Processed Rep.2015-05, 22 p. Alaska Fish. Sci. Cent., NOAA, Natl. Mar. Fish. Serv., 7600 Sand Point Way NE, Seattle WA 98115.	<a href="http://www.afsc.noaa.gov/Publications/ProcRpt/PR2017-05.pdf">http://www.afsc.noaa.gov/Publications/ProcRpt/PR2017-05.pdf</a>
Simpson, S. C., Eagleton, M. P., Olson, J. V., Harrington, G. A., and Kelly, S.R. (2017) Final Essential Fish Habitat (EFH) 5-year Review, Summary Report: 2010 through 2015. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/AKR-15, 115p.	<a href="https://alaskafisheries.noaa.gov/habitat/efh">https://alaskafisheries.noaa.gov/habitat/efh</a>
Spies, I., Aydin, K., Dan Nichol, D., Palsson, W., Jerry Hoff, J., and T.T. TenBrink (2017) Chapter 19. Assessment of the sculpin stock complex in the Bering Sea and Aleutian Islands. NPFMC Bering Sea and Aleutian Islands SAFE. North Pacific Fishery Management Council. December, 2017.	<a href="https://www.afsc.noaa.gov/REFM/Docs/2017/BSAIsculpin.pdf">https://www.afsc.noaa.gov/REFM/Docs/2017/BSAIsculpin.pdf</a>
Stevenson, D. E., and R. R. Lauth (2018) Bottom trawl surveys in the northern Bering Sea indicate recent shifts in the distribution of marine species. Polar Biol. pp 1–15	<a href="https://link.springer.com/article/10.1007%2Fs00300-018-2431-1">https://link.springer.com/article/10.1007%2Fs00300-018-2431-1</a>
Thompson, G.G. (2017) Chapter 2: Assessment of the Pacific Cod Stock in the Eastern Bering Sea. NPFMC Bering Sea and Aleutian Islands SAFE. North Pacific Fishery Management Council. December, 2017.	<a href="https://www.afsc.noaa.gov/REFM/Docs/2017/EBSpcod.pdf">https://www.afsc.noaa.gov/REFM/Docs/2017/EBSpcod.pdf</a>
Weidlich, S. and M. Downs (2016) APPENDIX A - BSAI Crab Rationalization Ten-Year Program Review: Social Impact	<a href="https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/Crab/AppendixA-">https://www.npfmc.org/wp-content/PDFdocuments/catch_shares/Crab/AppendixA-</a>

Reference	Hyperlink
Assessment. Prepared for: North Pacific Fishery Management Council. Prepared by: Northern Economics, Inc.	<a href="#">SocialImpactAssessment.pdf</a>
Wilderbuer, T.K., D.G. Nichol and J. Ianelli (2017) Chapter 4. Assessment of the yellowfin sole stock in the Bering Sea and Aleutian Islands. NPFMC Bering Sea and Aleutian Islands SAFE. North Pacific Fishery Management Council. December, 2017.	<a href="https://www.afsc.noaa.gov/REFM/Docs/2017/BSAlyfin.pdf">https://www.afsc.noaa.gov/REFM/Docs/2017/BSAlyfin.pdf</a>
Zador, S. and I. Ortiz (Eds.) (2018) Ecosystem Status Report 2018: Aleutian Islands. November 2018, Council Draft. 230 p.	<a href="https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/NovDraftDocs_2018.htm">https://www.afsc.noaa.gov/refm/stocks/plan_team/2018/NovDraftDocs_2018.htm</a>
Zheng, J. and J. Ianelli (2018) St. Mathew Island Blue King Crab Stock Assessment 2018. BSAI Crab SAFE, September 2018. 77 p.	<a href="https://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/CrabSAFE/2018/6-SMBKC_SAFE_2018.pdf">https://www.npfmc.org/wp-content/PDFdocuments/resources/SAFE/CrabSAFE/2018/6-SMBKC_SAFE_2018.pdf</a>

## 15. Appendices

### 15.1. Appendix 1 – Assessment Team Details

#### **Dr. Ivan Mateo (Lead Assessor)**

Dr. Ivan Mateo has over 20 years' experience working with natural resources population dynamic modeling. His specialization is in fish and crustacean population dynamics, stock assessment, evaluation of management strategies for exploited populations, bioenergetics, ecosystem-based assessment, and ecological statistical analysis. Dr. Mateo received a Ph.D. in Environmental Sciences with Fisheries specialization from the University of Rhode Island. He has studied population dynamics of economically important species as well as candidate species for endangered species listing from many different regions of the world such as the Caribbean, the Northeast US Coast, Gulf of California and Alaska. He has done research with NMFS Northeast Fisheries Science Center Ecosystem Based Fishery Management on bioenergetics modeling for Atlantic cod. He also has been working as environmental consultant in the Caribbean doing field work and looking at the effects of industrialization on essential fish habitats and for the Environmental Defense Fund developing population dynamics models for data poor stocks in the Gulf of California. Recently Dr. Mateo worked as National Research Council postdoc research associate at the NOAA National Marine Fisheries Services Ted Stevens Marine Research Institute on population dynamic modeling of Alaska sablefish.

#### **Dr. Wes Toller**

Wes has an extensive background in fisheries management and habitat conservation. As owner and operator of his own consulting business since 2010, Wes has worked closely with a number of leading certification schemes including the Marine Stewardship Council (MSC) and Aquaculture Stewardship Council (ASC) to develop and improve processes for auditing and accreditation of sustainability standards. He previously worked as a program manager with Accreditation Services International (ASI) where he helped establish the company's nascent MSC Program. Wes has an in-depth knowledge of ISO requirements and international best practices that pertain to eco-labelling. He has a detail-oriented work style and wide ranging interests. Wes has experience in many subject areas within the field of sustainability, and a specialist in sustainable use of fishery resources in the field of fisheries management and marine science. Wes received his doctorate in biological sciences from the University of Southern California. He currently resides in Seattle.